

Bulletin of
Duke University

1995-96

School of the Environment

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University Administration

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Calendar*

1995

August	
21	Orientation for fall semester
22-23	Registration of new and nonregistered returning students
28	Fall semester classes begin
September	
8	Drop/add ends
October	
16-17	Fall break
25	Registration begins for spring semester, 1996
November	
14	Registration ends for spring semester, 1996
15	Drop/add begins
22	Thanksgiving recess (begins at 12:40 p.m. Wednesday)
27	Classes resume
December	
1	Fall semester classes end
2-10	Graduate reading period
11-16	Final examinations

1996

January	
8	Orientation for spring semester
9	Registration of new and nonregistered returning students
11	Spring semester classes begin
24	Drop/add ends
March	
11-15	Spring break
27	Registration begins for fall semester, 1996
April	
11	Registration ends for fall semester, 1996
12	Drop/add begins
19	Spring semester classes end
20-28	Graduate reading period
29	Final examinations begin
May	
4	Final examinations end
12	Commencement

*The dates in the calendar are tentative and subject to change.

TO THE PROSPECTIVE STUDENT

"Academic excellence, environmental relevance" is a phrase that accurately describes the mission of the School of the Environment. Since its founding in 1938, the school has been dedicated to research and education designed to prepare professionals, scientists and academics to analyze a broad range of natural resource and environmental problems—and devise workable solutions. As we move into the next century, global environmental and economic concerns will increasingly demand well-trained professionals who can make sound decisions concerning the management of our natural resources and the improvement of our environment.

Our quantitative, interdisciplinary programs are designed to meet this need. Our faculty is actively engaged in both basic and applied research involving terrestrial ecosystems, marine ecosystems, earth sciences, and human interactions with the environment. Specific research and education programs focus on forest resources, ecology, coastal environmental management, ecotoxicology and environmental chemistry, biohazards, water and air quality, resource economics and policy, and ocean sciences. At Duke, we can draw upon the extensive educational resources of a major university; a 7,700-acre research forest; a host of organizations in the surrounding Research Triangle area; and the outstanding facilities of the Marine Laboratory, just three hours away.

Our graduates are among the leaders of the nation's largest environmental consulting firms and industries with environmental interests, as well as the public agencies and nonprofit organizations that monitor, manage and regulate natural resources and the environment. We have proven that we are among the best at what we do.

Our objective, however, is not merely research published or students graduated. It is wise and sustained management of our natural resources and a better environment for this and future generations. We invite you to join us in pursuit of these goals.



Norman L. Christensen, Jr.
Dean, School of the Environment

General Information



Introduction

The mission of the School of the Environment is education, research and service to understand basic environmental processes and to protect and enhance the environment and its natural resources for future generations. Intrinsic to this mission are (1) a commitment to interdisciplinary approaches, (2) a commitment to objective, or quantitative, approaches, (3) a commitment to principles of ecological integrity, (4) a commitment to the sustainable use of natural resources, and (5) a commitment to education across the curriculum. The overall objective is to assist in the definition and resolution of problems confronting society, through excellence in natural resource and environmental education and research.

During its six decades of natural resource education at Duke, the school has shifted from a focus on woodland productivity and protection to a focus on ecosystem productivity and protection and human-environmental interaction. The school's emphasis is on defining objectives for natural resource science and management, understanding the interrelated constraints—physical, biological, chemical, ecological, economic, legal and social—and devising and testing alternative management solutions. This approach to natural resource education is pursued through research, formal courses, field studies and seminars, and informally through interaction with practicing professionals by a variety of means. Research is integral to the school's mission. The faculty is engaged in a dynamic program of research, much of which is focused on contemporary natural resource and environmental issues, both terrestrial and marine, that are regional, national, and global in scope. Students are also encouraged to involve themselves in real world problems. As part of their professional degree requirements, students must complete a master's project requiring independent research and problem analysis.

Teaching and research in the School of the Environment are focused within the following curriculums: Forest Resource Management; Resource Ecology; Environmental Toxicology, Chemistry and Risk Assessment; Biohazard Science; Water and Air Resources; Resource Economics and Policy; Coastal Environmental Management; and Ocean Sciences. These programs are designed for students drawn from a wide variety of undergraduate backgrounds in the natural and social sciences, forestry, engineering, business and environmental studies. Program requirements enable all students to acquire the basic technical skills, knowledge, insight and methods of analysis for resolving natural resource and environmental problems. Few other universities attempt precisely this combination or have the emphasis on quantitative analysis that is common across all programs of study.

As a professional school within a private university, the School of the Environment is able to foster independent consideration of natural resource and environmental issues without the political pressures often brought to bear upon public institutions. As part of a major research university, the school is able to add a significant dimension to teaching and research through cross-campus interdisciplinary degree programs, faculty appointments, and cooperative projects.

Additional enrichment is available through agencies and institutions at the Research Triangle Park and through relevant departments at neighboring universities. These opportunities for study and professional interaction place Duke in an enviable position among schools of resource science and management and greatly enhance the quality of its programs.

Alumni of the School of the Environment hold leadership positions in public agencies, environmental and forestry consulting firms, private industry, and not-for-profit organizations throughout the nation and the world.

History

Duke University developed from Union Institute, a small school established in 1838 in Randolph County, North Carolina. The name was changed to Normal College in 1851, and in 1859, to Trinity College. The college was moved to Durham in 1892. With the establishment of the James B. Duke Indenture of Trust in 1924, Trinity College became Duke University. At the outset, the university developed around a core of undergraduate programs. Later the Graduate School and professional schools of Medicine, Nursing, Law, Engineering, Divinity, and Business Administration were added. In 1932, forestry instruction was offered for students of Trinity College, and in 1938 the School of Forestry was established as a graduate professional school under the direction of Dean Clarence F. Korstian. The Master of Forestry degree was offered initially and later the A.M., M.S., and Ph.D. were offered through the Graduate School. The school's forestry program has been fully accredited by the Society of American Foresters since 1939.

Dr. Korstian joined the faculty in 1931 as the first director of the Duke Forest. Brought to Durham by Dr. William P. Few, president of Duke at the time, Dr. Korstian set out to develop a "demonstration and research forest" that would serve as a model for owners of small tracts of timber in the South. During this period and for a number of years to follow, research focused primarily on problems of culture, management, and utilization of the softwoods and hardwoods of southern forests.

During the 1930s the faculty of the school was gradually expanded to include a number of research foresters who made substantial contributions to forestry in the Southeast. William Maughan, who specialized in forest management, joined the faculty in 1931. In 1935, Theodore S. Coile, a specialist in forest soils, was added to the faculty. Ellwood S. Harrar, a wood technologist, and Francis X. Schumacher, widely known for his contribution to forest measurements, arrived at Duke in 1937. In 1939, the school rounded out its initial faculty with three distinguished scientists: Roy B. Thomson in economics, James A. Beal in entomology, and Albert E. Wackerman in forest utilization. This faculty established and brought early recognition to the school. Later, faculty were added in silviculture, pathology, physiology, ecology, and biometeorology.

The expanded faculty was soon responsible for shifting the emphasis from southern forestry to research and teaching of forestry with a national and international point of view. Consequently, graduates of the school have found employment in public agencies, forest industries, education, and research in all parts of the nation.

Growing national concern with natural resources and environmental problems led to a new teaching and research emphasis in the 1970s. A new program in natural resource ecology, focusing on ecologically based land use planning, was added to the traditional forest science and management curriculum. In 1974 the name was changed to the School of Forestry and Environmental Studies and a new degree was added, the Master of Environmental Management.

In 1991, the School of Forestry and Environmental Studies combined with the Duke University Marine Laboratory to form the School of the Environment. The new school is an unprecedented development in graduate education and research in environmental science, policy, and management. It is the only private graduate professional school of forestry, environmental studies, and marine sciences in the country.

Location

Duke University is situated on the outskirts of Durham, a city of over 148,000 inhabitants, in the central piedmont region of North Carolina. The Appalachian escarpment lies approximately 100 miles to the west of Durham and the coastal plain is but a short distance to the east. The Marine Laboratory is located 180 miles to the east of Durham, on Pivers Island within North Carolina's Outer Banks, adjacent to the historic town of Beaufort. The school is thus ideally situated near areas of ecological and topographic diversity which offer many opportunities for study as well as recreation.

Piedmont North Carolina is characterized by a rolling, forested topography interspersed with small farms and rural communities in addition to the state's largest cities. The climax forests of the piedmont are hardwoods; however, human disturbance has resulted in the establishment of many forests of the native southern pines. It is in regions like piedmont North Carolina that many of the nonindustrial private forests of the United States are located. These forests are destined to provide much of the increase of wood and wood fiber to be needed by the United States in the twenty-first century.

The southern Appalachians are widely known for their unusual history, picturesque topography, and wide range of flora and fauna. Here the typical hardwood forests which dominate at lower elevations give way to forests of spruce and fir at higher elevations. These forests supply a variety of specialty woods for North Carolina furniture manufacturers and for other industries. The region's numerous recreation areas are widely used for hiking, fishing, skiing, and other outdoor activities.

The coastal plain of North Carolina, well known for its agricultural production, is used extensively by many of the nation's forest industries for plantations of the native pines. The extent of the intensive forestry practices in the coastal plains of North Carolina and other southern states is unmatched elsewhere in the world.

Coastal wetlands and estuaries, now recognized as one of the nurseries of world fisheries, offer abundant and valuable natural resources. North Carolina's Outer Banks and the barrier islands of the other southeastern states serve as protection for these coastal waters. The rapidly increasing population and development in this region make proper management of its natural resources particularly important to the nation.

Because of the school's central location near these regions of vital ecological importance, students are afforded the opportunity to study many current environmental problems in the field. Both the opportunity and the challenge exist to analyze these pressing problems and to develop sound approaches to their management.

Facilities

The School of the Environment is housed in the Levine Science Research Center, an interdisciplinary research facility situated at the corner of Science Drive and Research Drive on the West Campus. The new building includes state-of-the-art classrooms, research laboratories and instrumentation supporting both teaching and research for the programs offered by the school. A lounge, reading room, and computer laboratories are provided for students. Fully equipped modern teaching and research facilities for the ocean sciences are available at the school's coastal campus in Beaufort, N.C.

Computer Facilities. Duke's Computer Assist Center works in partnership with members of the university community to enable them to achieve their academic and research goals through computing. The center provides access to a variety of computing facilities and services through DukeNet, a high-speed data network, and various types of telecommunications linkages. The center maintains extensive MS-DOS/Windows and Macintosh personal computer and DEC workstation facilities at a number of locations on campus. All laboratories and clusters are equipped with either dot matrix or laser printers and several are connected to the campus telecommunications network. Electronic mail services are available for faculty and graduate students.

Other services include access to the national Internet data network and the Cray Y-MP/432 and massively parallel computing at the North Carolina Supercomputing Center and other supercomputer centers. Access to Duke's IBM ES/9000 mainframe computer is also available through the Computer Assist Center.

Libraries. The combined university libraries, including the main Perkins Library and twelve other school or branch libraries, contain over 4,200,000 volumes. About 150,000 volumes are added annually. The collection includes about 9,500,000 manuscripts and over 2,000,000 public documents.

The Biology-Forestry Library, located in the Biological Sciences Building, contains over 170,000 volumes and receives nearly 1,000 periodicals related to natural resources and the environment.

Greenhouses and the Phytotron. Adjoining the Biological Sciences Building are excellent facilities for biological investigations under controlled conditions. The phytotron contains fifty separately controlled growth chambers and greenhouses which can be used to grow plants under a variety of environmental conditions. The phytotron is one of few such facilities in the United States.

Research Triangle Park. Numerous industrial and governmental organizations have established research facilities in the Research Triangle Park, ten miles from the Duke campus. Government facilities include the National Environmental Research Center of the Environmental Protection Agency, the Forestry Sciences Laboratory of the United States Forest Service Southeastern Forest Experiment Station, and the National Institute of Environmental Health Sciences. These laboratories provide opportunities for student research and internships in some of the most advanced facilities in the nation.

Neighboring Universities. Through a reciprocal agreement, Duke students may supplement their education in forestry and the environmental sciences by taking courses in related fields at the University of North Carolina in Chapel Hill, North Carolina State University in Raleigh, and North Carolina Central University in Durham. Graduate students of Duke University and the University of North Carolina at Chapel Hill are granted library loan privileges in both universities.

The Duke Forest

The Duke Forest comprises approximately 7,700 acres of land in five major divisions and several smaller tracts. A ten-minute walk from campus will take one well into many parts of the Durham Division, and a network of roads and fire trails makes almost all areas of the forest easily accessible.

The forest lies primarily in Durham and Orange counties, near the eastern edge of the piedmont plateau, and supports a cross section of the woodlands found in the upper coastal plain and lower piedmont of the Southeast. A variety of timber types, plant species, soils, topography and past land use conditions are represented. Elevations range from 260 to 760 feet. Soils of the region are derived from such diverse parent materials as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives.

The Duke Forest, as it is known today, had its origins in the mid-1920s when the university administration bought many small farms and interspersed forest land as buffer areas for the main campus and as an investment for the future. The forest was placed under intensive management in 1931 by Dr. Clarence Korstian, its first director. In its early development, several basic objectives were emphasized: (1) demonstration of timber management techniques on a practical and economic basis, (2) development of an experimental forest for research in the sciences associated with timber growing, and (3) development of the area as an outdoor laboratory for students of forestry.

Modification of these early objectives has arisen, in part, through a greatly increased interest and dependence on the forest for research in the areas of zoology, botany, and ecology by faculty and students at Duke and neighboring universities. Background information useful to researchers is provided by the forest; it covers such features as

soils, topography, inventory, plantation, and cultural records as well as a bibliography of past and current studies. Current work on problems associated with developmental pressures at the urban-rural interface and integrated approaches to natural resource management have multiplied the forest's value and benefit as a resource.

Since 1976, the Duke Forest has been included in a nationwide network of research sites selected by the Institute of Ecology under a program sponsored by the National Science Foundation. These sites, designated as experimental ecological reserves, were selected to provide a wide range of conditions and habitat types for long-term scientific research in a multitude of disciplines.

The forest also serves in an educational and recreational capacity for residents of the Durham and Chapel Hill communities. Hiking, picnicking, jogging, and nature study are particularly popular pastimes.

This natural outdoor laboratory is an invaluable supplement to the instructional, research, and recreational facilities of the school, the university, and the region. The Duke Forest—in terms of its size, diversity, proximity to campus, and more than sixty years of accumulated research data—is a natural resource unequaled at any other academic institution.

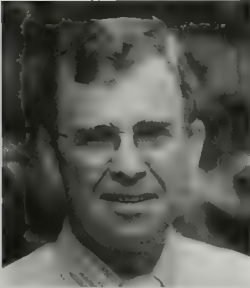
A comprehensive forest management plan provides a framework of basic guidelines and policies enabling effective utilization of the forest's potential. Development of the management plan was coordinated by a team of faculty, staff, and students representing a broad range of disciplines. Timber management, recreation, water quality, unique plant communities, historical and archaeological sites, and data management are a few of the criteria that were studied as part of the planning process. The plan concentrates on overlaying compatible uses of the forest in as many areas as possible. The completed document facilitates sound management and decision making, and it is flexible enough to allow adaptation to the changing needs and interests of all users of the forest.

The forest provides assistantships to several students in the school each year. Some of these are associated with research, others with the day-to-day operation and management of the forest.

Faculty



Core Faculty, Durham



Norman L. Christensen, Jr., Ph.D., *Professor*; B.A., M.A., Biology, California State University, Fresno; Ph.D., Biology, University of California, Santa Barbara.

Dr. Christensen is interested in the effects of disturbance on the structure and function of populations and communities. On-going studies include an analysis of patterns of forest development following cropland abandonment as these are affected by environment, stand history, and plant demographic patterns. This research focuses on the historical data sets and resources of the Duke Forest. He is also conducting research on the southeastern coastal plain and western Sierra Nevada focused on a comparison of biogeochemical and community responses to varying fire regimes. These studies are aimed at an understanding of the evolutionary and ecosystem consequences of fire and the application of such information in the development of wilderness management and policy protocols. In addition, Dr. Christensen is conducting research on the use of remote sensing systems, such as synthetic aperture radar, to evaluate long-term changes in forest ecosystems.



Christopher B. Craft, Ph.D., *Assistant Research Professor*; B.A., Biology, University of North Carolina-Asheville; M.S., Ecology, University of Tennessee; Ph.D., Soil Science, North Carolina State University.

Dr. Craft's research interests focus on the role of the soil resource in biogeochemical cycles and ecosystem processes. Specifically, he is interested in the effects of human activities on elemental cycling in soils and vegetation. This research includes sedimentation and accretion processes, nutrient transformations in aerobic and anaerobic soils, and soil genesis and evolution.

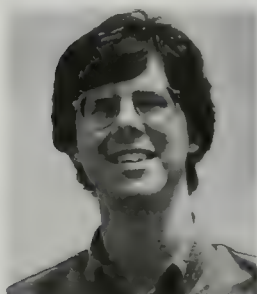
Current areas of research include the role of wetlands in (1) the removal of pollutants and enhancement of water quality, (2) soils as reservoirs in the global carbon cycle, (3) the response of coastal wetlands to rising sea level, and (4) reclamation and restoration of surface mined lands.



Richard T. Di Giulio, Ph.D., *Associate Professor*; B.A., University of Texas; M.S., Wildlife Management, Louisiana State University; Ph.D., Wildlife Biology, Virginia Polytechnic Institute and State University.

Dr. Di Giulio's research group in environmental toxicology is chiefly involved with integrated basic and applied research in aquatic biochemical toxicology. Basic studies focus on xenobiotic metabolism and modes of action in lower vertebrates and invertebrates. Results of these studies are used to develop sophisticated, sensitive biochemically based indices (biomarkers) of environmental quality.

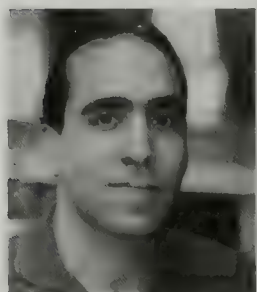
He is particularly interested in the application of free radical biology theory to the elucidation of mechanisms of contaminant metabolism and toxicity in aquatic animals. Recent research in this vein has included studies of contaminant mediated oxyradical production in fish and bivalves, glutathione synthesis and utilization in channel catfish, antioxidant defense mechanisms in aquatic animals, mechanisms of genotoxicity in benthic fish, and biochemical effects of pulp and paper mill effluents and genotoxic sediments in freshwater fish.



Bruce C. Faust, *Assistant Professor*; B.S., Civil and Environmental Engineering, University of Minnesota at Minneapolis; Ph.D., Environmental Engineering Science, California Institute of Technology.

Dr. Faust is interested in fundamental research on environmental aquatic chemistry, geochemistry and photochemistry of natural waters and the atmosphere, including fresh and marine waters, clouds and aerosols. He is interested in (1) understanding the mechanisms of chemical reactions at a molecular level, (2) describing their reaction dynamics and equilibrium (or steady state), and (3) assessing effects of the reactions at the larger spatial scales that are typical of chemical pollution and geochemical cycles.

Dr. Faust's research interests include oxidation-reduction and photochemical reactions, complexation reactions, and surface reactions that transform natural or anthropogenic compounds in clouds, aerosols, or fresh or marine waters. Reactions that affect the speciation, geochemical cycling, or biological uptake of metals, oxidants, nutrients, or other chemicals or elements are of interest.

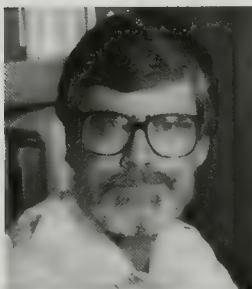


Jonathan H. Freedman, Ph.D., *Assistant Professor*; B.A. Microbiology, Rutgers University; M.S., Ph.D., Molecular Pharmacology, Albert Einstein College of Medicine.

Dr. Freedman's research is directed toward understanding the regulatory mechanisms controlling an organism's response to environmental stress. In particular, he is interested in how they are exposed to toxic concentrations of heavy metals. He is investigating these processes using the microscopic soil nematode, *Caenorhabditis elegans*, as a model system. *C. elegans* is archetypical for the study of development, signal transduction and gene regulation in a whole organism. Results from this research will help elucidate how an organism adapts to an increasingly toxic environment.

A second area of his research focuses on understanding the mechanism of gene regulation of the metal-binding protein, metallothionein. Multiple factors—including those involved in metalloregulation, development, and cell specificity—must coordi-

nately interact to activate metallothionein gene transcription. He is using in vivo techniques to monitor gene activity, RNA accumulation, and protein expression in individual cells within the nematode. As a result of this research, genetically engineered nematodes have been developed that may be used as biomonitors for environmental toxins.



Robert G. Healy, Ph.D., *Professor*; B.A., M.A., Ph.D., Economics, University of California, Los Angeles.

Dr. Healy works on land-use and environmental policy in the United States and developing countries. Before coming to Duke in 1986, he was senior associate at The Conservation Foundation/World Wildlife Fund in Washington, DC. His past research has resulted in books on state land-use planning, coastal zone management in California, rural land markets, national forest policy, resource and environmental problems of agriculture, and environmental policy in developing countries. He has a continuing interest in land-use policy in fast growing areas, particularly the U.S. South and rural areas affected by rapid migration or by tourism. Dr. Healy teaches courses on land-use and environmental policy and on conservation and sustainable development in the Third World.



Julie A. Johnson, Ph.D., *Assistant Research Professor*; B.A., Human Biology, Stanford University; Ph.D., Zoology, University of Edinburgh.

Dr. Johnson's current research interests lie in two related areas: (1) sustainable development, and whether it can really be made to work; and (2) the contributions of science to natural resource policy, both the incorporation of natural science findings into policy, and the communication of policy information needs to researchers in the natural sciences. Her past research has been in primate social behavior, particularly the nepotistic process of dominance rank acquisition in baboons. Field work in Tanzania and Kenya has led her to concentrate on the conflicting interests shaping natural resource utilization. Of particular concern are countries coping with rapid population growth, and economic and political pressures that favor unsustainable use of resources.

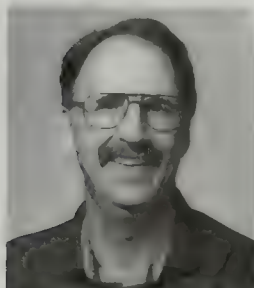
Before coming to Duke to work at the Center for Tropical Conservation, Dr. Johnson was a science fellow at the United States Agency for International Development. There, her concerns were environmental health, health policy, and the role of women in development, particularly with reference to natural resource use.



Gabriel G. Katul, Ph.D., *Assistant Professor*; B.E., Civil Engineering, American University of Beirut; M.S., Civil Engineering, Oregon State University; Ph.D., Civil Engineering, University of California, Davis.

Dr. Katul's research focuses on hydrology and fluid mechanisms in the environment. In particular, he is interested in heat and water transport in the vadose zone and its importance in characterizing surface layer turbulence. He has carried out many laboratory and field experiments to characterize the parameters of heat and momentum transport mechanisms across the land-atmosphere interface and to determine their relationship to the local and regional hydrologic budget.

Recent work has centered on various aspects of hydrology and environmental fluid mechanics such as (1) heat and momentum fluxes over complex watershed terrain, (2) heat and water movement in unsaturated field soils, (3) the structure of turbulence close to the land-atmosphere interface, and (4) the impact of hydrologic processes on the spatial structure of soil moisture content.



Eric S. Kasischke, Ph.D., *Assistant Research Professor*; B.S., Natural Resources, M.S., Remote Sensing, Ph.D., Remote Sensing and Forest Ecology, University of Michigan.

Dr. Kasischke's research focuses on utilization of airborne and satellite imagery to study characteristics and patterns of change in forested landscapes. His research focuses on developing new techniques to exploit information from a variety of remote sensing systems, ranging from multispectral scanners to imaging radars. The studies are carried out in a variety of regions, including the southeastern United States, Brazil, the

Pacific Northwest and Alaska.

Over the past several years, Dr. Kasischke's research has focused on developing methods to monitor the location, areal extent and damage of fires in Alaskan boreal forests. He and his students are developing models to study the relationship among fire, forest succession, and carbon storage release in this important biome. They are also creating methods to link the information derived from satellite remote sensing systems to these models using geographic information systems. Similar approaches are being developed for other forest regions in order to develop better methods to estimate the global carbon budget.

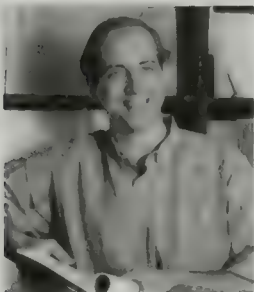


Kenneth R. Knoerr, Ph.D., *Professor*; B.S.F., Forestry, University of Idaho; M.F., Forestry, Ph.D., Yale University.

Dr. Knoerr's research emphasizes investigations of the processes by which plants interact with the atmosphere. This research is approached from two perspectives. The first is the development of physical models for the plant-environment interaction. The second, in parallel with the modeling, is an extensive experimental effort to collect data on the gradients of radiation, wind, temperature, humidity, carbon dioxide and other environmental parameters that characterize the micro-

climate of forests.

His research group is involved in an intensive study to measure and model the characteristics of air flow within the forest. These models will increase the understanding of the turbulent exchange of gases between forest vegetation and the atmosphere, the diffusion patterns of disease spores and pollen within the forest, and the mechanisms by which forests remove aerosols from the atmosphere.



Randall A. Kramer, Ph.D., *Associate Professor*; B.A., Economics, University of North Carolina; M.E., Economics, North Carolina State University; Ph.D. Agricultural Economics, University of California, Davis.

Dr. Kramer's research interests are environmental economics, quantitative policy analysis, and sustainable development. Currently, the major focus of Dr. Kramer's research group is economic valuation of environmental quality. One such project in Madagascar is focusing on nature tourism,

extraction of minor forest products, and deforestation-flooding interactions. Other research projects on economic valuation in the United States include a study of air pollution damages to high elevation Appalachian forests and an assessment of Hurricane Hugo damage to wetland ecosystems and endangered species habitat.

Another area of research for Dr. Kramer is the economics of wetland policies. He has conducted studies for government agencies to examine factors influencing land-owners to convert wetlands and means of making government wetland policies more effective.



Janet S. MacFall, Ph.D., *Assistant Research Professor; B.S., Biology, Juniata College; M.S., Botany, University of Maryland; Ph.D., Plant Pathology, University of Wisconsin.*

Dr. MacFall's research centers on interactions between pathogenic and symbiotic associations and nutritional/water relations of trees. This interest is focused on below-ground processes, including the impacts of ectomycorrhizae on phosphorus biomineralization and water uptake and transport. The ecology of pathogenic associations is part of her research emphasis with respect to root and stem function in plant water relationships. This has been extended to the study of fusiform rust in pines, emphasizing effects of gall formation on tree water relations and the development of mechanisms of resistance and tolerance through coevolution.

Additionally, she is developing innovative techniques using high resolution magnetic resonance imaging in the study of water distribution and binding within plants and soils. This emerging technology has allowed the direct visualization of three-dimensional water depletion zones around specific roots in soils, development of root models showing growth and senescence over time, patterns of water uptake and transport through roots and stems, and direct observation and measurement of water binding. She is applying this technology to address fundamental biological questions of how plants interact with the environment.



Lynn A. Maguire, Ph.D., *Associate Professor of the Practice of Environmental Management; A.B., Biology, Harvard University; M.S., Resource Ecology, University of Michigan; Ph.D., Ecology, Utah State University.*

The major area of Dr. Maguire's current research is the application of formal techniques for decision making under uncertainty to the resolution of environmental conflicts. Decision analysis provides a framework for integrating scientific information from ecological theory and empirical studies with economic and public policy considerations affecting the management of natural resources.

Using these techniques, Dr. Maguire and her students are studying multiple-use land management in southern Appalachian national forests and values of forested wetlands. Beyond these specific research projects, she is interested in (1) the application of population dynamics, population genetics and ecological theory to the conservation of animal and plant populations; (2) the use of decision analysis to resolve disputes in endangered species management and land-use planning; and (3) the use of quantitative methods to integrate scientific information in resource management.



Carol A. Mansfield, Ph.D., *Assistant Professor; B.A., Economics, Yale University; Ph.D., Economics, University of Maryland.*

Dr. Mansfield's research interests include the areas of environmental and public economics, with an emphasis on quantitative analysis. Her current research focuses on the use of contingent valuation surveys to price environmental resources and the individual decision-making processes. This work has two primary goals. The first is to evaluate how people react to hypothetical survey questions and whether their answers contain information that is useful to policy makers.

A second is to explore alternatives to the standard economic model of decision making and the implications for environmental policy. A secondary issue is the use of contingent value surveys to devise methods of compensating communities that agree to accept lower environmental quality, for example, allowing a landfill to be built in their area. In addition to this, she has begun research on the effect of environmental regulations on the location decisions of businesses.



Ram Oren, Ph.D., *Associate Professor; B.S., Forest Resource Management, Humboldt State University; M.S., Ph.D., Forest Ecology, Oregon State University.*

Dr. Oren's research examines ecological phenomena of plant interaction in relation to the environment. He is particularly interested in the nutritional dynamics of plants as affected by nutrient supply and demand. In tropical ecosystems, he studies the seasonal hydrological budget and the size and frequency of ecological groups.

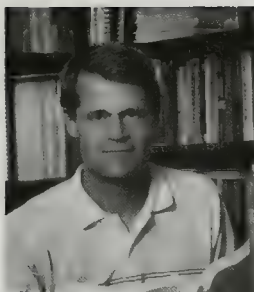
In Germany, Dr. Oren's research on forest decline led him to construct a conceptual model of nutritional disharmony. The model describes the differential effects of imbalanced nutrition on plant growth and function. The model is being tested locally in pine and mixed pine-hardwood plantations. He is also testing the link between remotely-sensed data and ground measurements made in the Rio Bravo Reserve, Belize. The objective is to partition forest types into smaller stands of vegetation based on sets of ecophysiological characteristics and to quantify the effect of land-use alterations on the seasonal hydrological cycle.



Robert G. Qualls, Ph.D., *Assistant Research Professor; B.S., Biology, M.S.P.H., Environmental Science and Engineering, University of North Carolina; Ph.D., Ecology, University of Georgia.*

Dr. Qualls's research focuses on the reasons why some ecosystems are efficient in recycling and storing nutrients while others are leaky and susceptible to disruption of their nutrient cycles and fertility. He has carried out laboratory and field research to answer these questions in forested swamps, the marshes of the Florida Everglades, and the forests of the Appalachian Mountains. More specifically, his recent work has

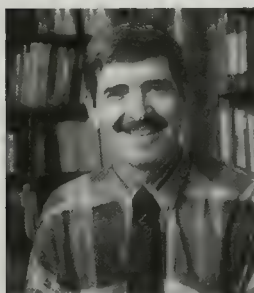
involved nutrient dynamics in phosphorus saturated marshes of the Everglades; the hydrology of forested hill slopes; environmental microbiology; the formation, storage and loss of nutrients in soil organic matter; movement of nutrients carried by dissolved humic acids; and the influence of climatic warming and ultraviolet radiation on the mineralization of nutrients.



Kenneth H. Reckhow, Ph.D., *Associate Professor*; B.S., Engineering Physics, Cornell University; M.S., Ph.D., Environmental Science and Engineering, Harvard University.

Dr. Reckhow's research activities have focused on the development, evaluation, and application of models for the management of water quality. In particular, he is interested in the effect of uncertainty on model specification, parameter estimation, and model applications. Recent work has expanded this theme to consider the effect of scientific uncertainties on water quality decision making.

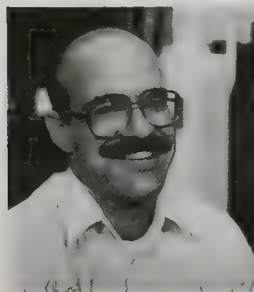
Among the problems that Dr. Reckhow's research group has examined are lake eutrophication, toxic substances, and acid rain. Past work on eutrophication has centered on the development and evaluation of empirical models, estimation of prediction uncertainty using first order error analysis and Monte Carlo simulation, and a decision analytic approach to lake management. Current work by Dr. Reckhow and his students concerns errors-in-variables and parameter identification in mechanistic models.



Curtis J. Richardson, Ph.D., *Professor*; B.S., Biology, State University of New York at Cortland; Ph.D., Ecology, University of Tennessee.

Dr. Richardson's research interests in applied ecology center on long-term ecosystem response to large scale perturbations such as acid rain, toxic materials, flooding, or nutrient additions. He has specific interests in wetland ecosystems, phosphorus nutrient dynamics, and the effects of environmental stress on plant metabolism and growth. Major research focuses on wetlands as nutrient sinks.

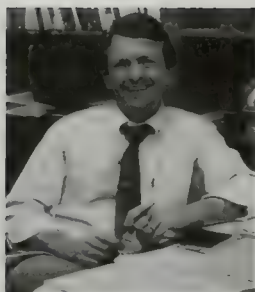
His current research activities include: (1) the effects of nutrient additions and hydrology on Everglades phosphorus retention and community changes; (2) heavy metal sorption, storage and removal from drained pocosin peatlands; (3) wetland development trends in the southeastern United States; and (4) mechanisms for iron and manganese removal in constructed wetlands used for the improvement of coal mine drainage.



Daniel D. Richter, Ph.D., *Associate Professor*; B.A., Philosophy, Lehigh University; Ph.D., Forest Soils, Duke University.

Dr. Richter's research objectives are centered on understanding and quantifying soil change that is affected by long-term forest development and land use. His work is directed at quantifying how nutrient and hydrologic cycles control the chemistry of forest soils, drainage waters and forest productivity. His scientific interests in these topics are motivated by a desire to improve the management of soil-plant-watershed systems to support long-term human use. The responses of poorly buffered soils are

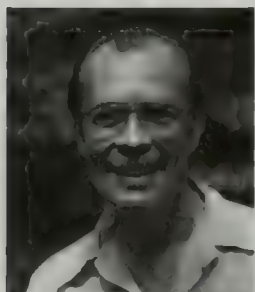
of most interest, most particularly extremely weathered, acidic Ultisols that are common to the southeastern United States and to the forests of the humid tropics. His research objectives are pursued both individually and cooperatively with scientists from several disciplines. His primary educational objectives are to help students develop an understanding of and appreciation for ecological functions of soil and forest ecosystems through lectures, seminars, field trips, and indoor and outdoor laboratories.



John T. Sigmon, Ph.D., *Associate Professor of the Practice of Environmental Science; A.B., Chemistry, Ph.D., Forest Meteorology, Duke University.*

Dr. Sigmon's research has focused on surface-atmosphere interactions over complex terrain with an emphasis on chemical transformations and deposition. One component of this research has addressed the linkages between surface layer processes and the larger scale flows in the planetary boundary layer.

Currently, Dr. Sigmon is working on a research project attempting to identify and quantify the non-methane hydrocarbons emitted from various types of tree species and the development of methods for field measurements of these compounds.



John Terborgh, Ph.D., *James B. Duke Professor; B.S., Biology, M.S., Ph.D., Plant Physiology, Harvard University.*

Dr. Terborgh's interests lie in the fields of tropical ecology and conservation. At different times in his career he has studied birds, primates, herbs and forest trees, and has directed student projects involving butterflies, lizards, amphibians and crocodilians. The common denominator in all this work has been the goal of solving problems of general ecological interest using a comparative approach. Some typical comparisons have involved seasonal patterns in resource utilization by forest primates, habitat use by Amazonian birds and latitudinal variation in the structure of mature forests.

Applications of ecology to conservation have increasingly become a central theme of his work. He regards as particularly important the need to understand the many consequences of habitat fragmentation, especially those related to the disruption of trophic level processes.



Jerry J. Tulis, Ph.D., *Adjunct Associate Professor; B.S., Bacteriology, University of Illinois; M.S., Medical Microbiology, Loyola University; Ph.D., Radiobiology, Catholic University of America.*

Dr. Tulis is primarily interested in the detection, amelioration, and prevention of adverse health effects in the occupational and environmental setting as a result of exposure to biohazardous agents and materials. Specifically, he is interested in (1) the improvement of indoor environments from the viewpoint of bioaerosols, including the identification and control of harmful aerosols composed of opportunistic and pathogenic microorganisms, biological toxins, and allergens; (2) the mitigation of hazardous waste using bioremediation technology; (3) research on the development of biocidal materials; (4) the development of preventive measures to limit zoonotic infections in various zoologic and field operations; and, (5) the control of mycotoxin production resulting from the growth of various saprophytic fungi in the agricultural setting. His current research involves studies on the growth-promoting potential of fungal contaminants of fiberglass duct lining and duct board, and nationwide risk assessment studies for the EPA on occupational and environmental biohazards in various workplaces, including laboratories, Superfund sites, and marine operations.



Dean L. Urban, Ph.D., *Assistant Professor; B.A., Botany and Zoology, M.A., Wildlife Ecology, Southern Illinois University; Ph.D., Ecology, University of Tennessee.*

Dr. Urban's research interest is in landscape ecology: the development and implications of landscape pattern. He uses simulation models to explore the interplay of abiotic environmental templates (temperature, moisture gradients), biotic processes (plant demography, competition, dispersal), and disturbances (including human land use) in governing forest dynamics in montane landscapes. One current project uses a

model as a framework for comparisons among forests in the Oregon Cascades, the Sierra Nevada of California, the White Mountains of New Hampshire, and the southern Appalachians of North Carolina.

Building on his work in forests, Dr. Urban is also interested in wildlife communities in patchy landscape mosaics. In this, his focus is on how landscape pattern and meta-population processes interact to generate landscape-scale patterns in biodiversity. One emphasis of this research is to use models, interfaced with geographic information systems, to explore alternative forest management strategies that might maintain landscape diversity while reconciling competing demands on forest resources.

Core Faculty, Beaufort



Richard T. Barber, Ph.D., *Harvey W. Smith Professor; B.S., Zoology and Botany, Utah State University; Ph.D., Biological Science, Stanford University.*

Dr. Barber's research in carbon cycling by ocean processes has implications for both basic and applied science. At Duke Dr. Barber investigates the interrelationship between large scale thermal dynamics and ocean basin productivity. His work focuses on (1) how biological and physical processes contribute to the exchange of carbon dioxide between the ocean and the atmosphere and (2) how the "biological pump"

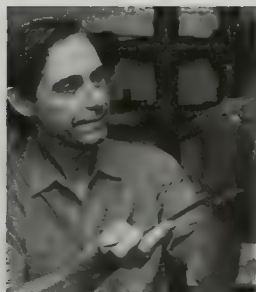
transfers carbon into the deep sea. Work in the coming year will be carried out on cruises to the Arabian Sea as part of the Joint Global Ocean Flux Study and by modeling at the North Carolina Supercomputer Center.



Celia Bonaventura, Ph.D., *Professor; B.A., Zoology, San Diego State University; Ph.D., Biochemistry, University of Texas, Austin.*

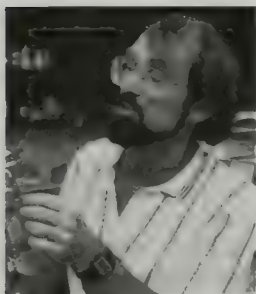
Most of Dr. Celia Bonaventura's research is in the area of structure/function relationships of oxygen and electron-transport proteins. This continues to be her primary area of research, with an increasing focus on environmental perturbations of structure and function. Her research makes use of structural assays and complementary measurements of rapid reaction kinetics and equilibria, using UV/VIS and fluorescence spectroscopy. Through comparison of human proteins

with proteins of species inhabiting diverse environments, studies by Dr. Bonaventura and collaborators have increased an understanding of structural mechanisms that allow respiratory proteins to satisfy widely different physiological and environmental demands. Her current research concerns aspects of environmental toxicity associated with free-radical interactions with respiratory proteins and structural alterations of respiratory proteins that are indicative of exposure to xenobiotics.



Joseph Bonaventura, Ph.D., *Professor*; B.A., Zoology, San Diego State University; Ph.D., Biochemistry, University of Texas, Austin.

Dr. Joseph Bonaventura's research involves marine organisms found in diverse environments. Biochemical studies on the structural and functional diversity of these organisms has been shown to be paralleled by diversity at the molecular level. Red cells and respiratory proteins of marine organisms are being studied in order to increase the understanding of molecular adaptations and the mechanisms that give rise to functional flexibility. The kinetics and equilibria of ligand binding to hemoglobins, hemocyanins, and cytochrome c oxidase are studied with emphasis on the reactivity of these proteins as regulated by metabolic effectors. These studies are complemented by work in the Protein Engineering and Technology Laboratory where properties of chemically modified, crosslinked, and immobilized forms of biologically active molecules are characterized. Recent research concerns the development of a synthetic blood substitute for humans. The project involves a detailed study of structure-function relationships in the human hemoglobin molecule and includes site-directed mutagenesis of hemoglobin genes. A new focus concerns the biochemistry of nitric acid in the human body and the development of a hypothesis of how this simple molecule might act as a regulator of the biosphere.



Marius Brouwer, Ph.D., *Research Professor*; B.S., Biology, M.S., Biochemistry and Microbiology, Ph.D., Biochemistry, University of Groningen, The Netherlands.

The major objective of Dr. Brouwer's research is to better understand the dual role of transition metals, as both essential and toxic elements, in biological systems. Metal ions are integral, functional components of many enzymes and transcriptional regulatory proteins. On the other hand, binding of metals to biological macromolecules often perturbs their function, and metal-catalyzed formation of oxygen radicals has been implicated in inflammatory disorders as well as in mutagenicity, carcinogenicity, and aging. To cope with these hazardous elements, organisms have developed finely-tuned strategies to control their concentration and availability. Studies are being conducted on the molecular components and events involved in the incorporation of metals into apometalloenzymes, and the molecular mechanisms of trace metal detoxification and toxicity. Recent research focuses on the development of cellular and molecular indicators of hypoxia-induced stress in estuarine ecosystems. Marine invertebrates are used as experimental animals. The research involves studies at the molecular (DNA/RNA and protein), cellular and organismal levels, and is carried out in the laboratory and the field.



Richard B. Forward, Jr., Ph.D., *Professor*; B.S., Biology, Stanford University; Ph.D., Biology, University of California, Santa Barbara.

Dr. Forward's research generally concerns the physiological ecology of marine animals. Specific research deals with biological rhythms in egg hatching of crustaceans and peptide pheromone communication between embryos and adults at the time of hatching. Additional laboratory and field studies concern horizontal transport of crustaceans and fish larvae in estuarine and coastal areas. Depth regulation in response to temperature, salinity and pressure are studied to explain the transport by larvae of different ages in currents at different depths.

The photobehavior and photophysiology involved in diel vertical migration of zooplankton is also studied in the laboratory using a lighting system that mimics the underwater angular light distribution. Behavior of all zooplankton is observed and recorded with a video system and responses are analyzed with a motion analysis system.



Peter A. Howd, Ph.D., *Assistant Professor; B.A., Geology and Economics, Williams College; M.S., Ph.D., Oceanography, Oregon State University.*

Dr. Howd's research interests focus on waves and currents in the surf zone and how they interact to determine the evolution of beach morphology. Current research addresses two areas, the description of low frequency (infragravity) waves, and the time scales of beach profile variability. Infragravity waves are the dominant wave energy source during storms on most shorelines and are also thought to be responsible for controlling sand bar formation. The goal of this research is an understanding of how these waves are generated, and how they interact with other surf zone processes to shape the beach profile during a storm event. This research combines the collection and analysis of field data with theoretical modeling. The different time scales (from days to many years) of beach change are being studied using data collected on the Outer Banks. This project is aimed at understanding how possible changes in storm frequency and severity due to global climate change may impact the fragile balance that exists on many undeveloped shorelines.



William W. Kirby-Smith, Ph.D., *Associate Professor of the Practice of Marine Ecology; B.S., Biology, University of the South; Ph.D., Zoology, Duke University.*

Dr. Kirby-Smith's research interests involve marine ecology and invertebrate zoology. His recent research projects include the following: (1) ecology of rock outcrop communities on the continental shelf; (2) effects of salt marsh modifications on plant, invertebrate, fish and bird communities; (3) influence of pine plantation drainage on water quality and benthic invertebrates in receiving estuarine headwaters; (4) effects of agricultural development upon hydrology, water quality and biology in estuarine headwaters; and (5) the fate of fecal coliform bacteria in storm water runoff and estuarine headwaters. Additional research interests include the physiology of suspension feeding and its ecological consequences in estuaries.

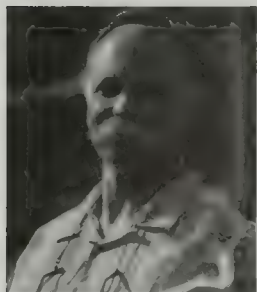


M. Susan Lozier, Ph.D., *Assistant Professor; B.S., Chemical Engineering, Purdue University; M.S., Chemical Engineering, Ph.D., Oceanography, University of Washington.*

Dr. Lozier's research interests lie in the general area of mesoscale and large scale ocean dynamics. Specifically, she is interested in the Lagrangian aspects of ocean circulation, cross-frontal exchange processes and climate dynamics. Her approach to the study of these topics ranges from the application of numerical models to the analysis of observational data, with the focus on the testing and development of theory.

Currently, Dr. Lozier is focusing on the determination of the climatological mean circulation of the north Atlantic Ocean. This work involves the merging of historical hydrographic data and long-term measurements of the flow with the dynamics of the

region through the formalism of an inverse model. A major objective of this work is to establish the background variability of the ocean during the past century. Current work also involves the study of particle paths within the context of a general ocean circulation model.



Michael K. Orbach, Ph.D., *Professor of the Practice of Marine Affairs and Policy*; B.A., Economics, University of California, Irvine; M.A., Cultural Anthropology, University of California, San Diego; Ph.D., Cultural Anthropology, University of California, San Diego.

Dr. Orbach's research interests are in the application of social and policy sciences to coastal and ocean policy and management. His work uses a cultural, or human, ecology perspective to analyze human behavior in coastal and ocean environments. His current research projects include (1) the development and application of limited entry and effort management systems to marine fisheries; (2) the formation and socioeconomic impact of marine minerals policy; (3) marine mammal and endangered species-fisheries conflicts; and (4) citizen involvement in coastal and ocean policy. Dr. Orbach specializes in the application of science to the policy and management process.



Joseph S. Ramus, Ph.D., *Professor*; A.B., Botany, Ph.D., Botany, University of California, Berkeley.

Dr. Ramus's research includes the study of physical forcing of primary productivity in coastal plains estuaries. The research seeks a match between physiological response and the temporal frequency of physical drivers, the phasing of the organism with its environment.

Another of Dr. Ramus's interests involves biotechnological research which includes extracellular polysaccharides produced by marine microphotoautotrophs. Two aspects are under investigation: (1) environmental regulation of carbon partitioning; i.e., the diversion of newly fixed carbon from growth (new photosynthetic machinery) to disposable heteropolysaccharides (viscoelastic biopolymers), and (2) drag reducing properties of the biopolymers in pipe flow.

A third area under investigation is photoacclimation and photoinhibition in seaweeds and seagrasses. Of specific interest are macromolecular changes in the photosynthetic apparatus, the dynamic range of change and the effect of change on growth rate.



Daniel Rittschof, Ph.D., *Associate Professor*; B.S., Ph.D., Zoology, University of Michigan.

Dr. Rittschof's research interests involve chemical communication systems. His studies include external and internal molecular mediation of behavior (chemical ecology). At present, test systems are marine and include crustaceans (true crabs, hermit crabs and barnacles), molluscs and fish. Studies span the gamut from practical (nontoxic antifouling coatings, fish foods and fish feeding stimulants) to purely basic (larval release pheromones, designer peptides with biological activity, hermit crab shell attractant cues, hormonal control of feeding behavior, and enzymatic activities in crustacean and gastropod saliva). The driving theme of the work is the evolution of chemical communication systems and their components.



Christopher A. Scholz, Ph.D., *Assistant Research Professor*; B.A., Geology, University of Vermont; M.S., Geology, University of Minnesota; Ph.D., Geology, Duke University.

Dr. Scholz's current research projects are concentrated on continental rifts and on several of the world's largest lakes. Single channel and multichannel seismic reflection profiling techniques enable him to acoustically image extensive areas of the sedimentary basins of Lake Malawi and Lake Tanganyika in east Africa and Lake Baikal in western Siberia. These three lakes, which are among the world's largest and deepest, are the best modern examples of lacustrine rift systems, and thereby provide modern analogs for many ancient rift basins around the world.

Extended Faculty

S. Marshall Adams, Ph.D., *Adjunct Professor*; B.S., Wildlife Biology, M.S., Zoology, North Carolina State University; Ph.D., Marine Science, University of North Carolina at Chapel Hill.

Dr. Adams is principal investigator of several large projects at Oak Ridge National Laboratory related to effects of environmental stress on aquatic ecosystems. His research interests are in the general areas of environmental impact assessment and biological indicators of aquatic ecosystem health.

Stephen G. Boyce, Ph.D., *Adjunct Professor*; B.S., M.S., Forestry, Ph.D., Plant Ecology, North Carolina State University.

Dr. Boyce's current research interest is the design of models to aid managers in the culture of forests and ecosystems. Chief ecologist, retired, with the USDA Forest Service Southeastern Forest Experiment Station, he has pioneered in the development and application of systems approaches to forest planning, management, and research.

Frederick W. Cubbage, Ph.D., *Adjunct Professor*; B.S., Forestry, Iowa State University; M.S., Forest Policy, Ph.D., Forest Economics, University of Minnesota.

Dr. Cubbage is professor of forestry and director of the forestry program in the College of Forest Resources at North Carolina State University. His primary research interests are the regulation of private forest landowners, timber production and harvesting economics, timber supply modeling, and forest policy issues.

Alexander T. Davison, M.F., *Lecturer*; B.S., Botany, M.F., Forest Entomology, Duke University.

A consultant in forest land management, Mr. Davison is interested in the use of aerial photographic interpretation to trace land-use history, facilitate forest management, and increase the efficiency of forest inventory. He is also interested in small, private timberland ownerships, particularly in problems involving the enhancement of forestry and wildlife management.

Michael P. Dieter, Ph.D., *Adjunct Professor*; B.S., University of Notre Dame; M.A., Ph.D., Zoology, University of Missouri.

Dr. Dieter is a physiologist and science editor for *Environmental Health Perspectives* at the National Institute of Environmental Health Sciences. His research interests lie in the area of environmental toxicology of metals, mammalian toxicology and carcinogenesis, and cellular biochemistry and physiology.

George R. Dubay, Ph.D., *Assistant Research Professor*; B.S., Chemistry, Fairfield University; Ph.D., Physical Organic Chemistry, Duke University.

Director of instrument operations in Duke's chemistry department, Dr. Dubay is interested in mass spectrometry methods to identify and quantitate environmental contaminants and biochemically interesting compounds.

Milton S. Heath, Jr., J.D., *Adjunct Professor*; A.B., Harvard University; LL.B., J.D., Columbia University.

Dr. Heath specializes in environmental and natural resource law and administration, and the legislative and other governmental aspects of resource development. He is a member of the Institute of Government faculty at the University of North Carolina.

Craig C. Freudenrich, Ph.D., *Assistant Research Professor*; B.A., Biology, West Virginia University; Ph.D., Physiology, University of Pittsburgh.

Dr. Freudenrich is interested in the control, modulation, and regulation of cellular ion homeostasis and how environmental pollutants can alter ion homeostasis, thereby affecting cell function. He is currently developing a cell culture model of the barnacle mineralizing epithelium that will be useful for investigating the cellular ion transport mechanisms of biomineralization and the influence of the environment (for example, environmental pollutants and heavy metals) on barnacle growth and development.

Thomas P. Holmes, Ph.D., *Adjunct Assistant Professor*; B.S., M.S., Agricultural Economics, University of Connecticut; Ph.D., Economics, Ohio Wesleyan University.

Dr. Holmes is a research forester with the USDA Forest Service's Economics of Forest Protection and Management work unit at Research Triangle Park, N.C. His research focuses on the application of nonmarket valuation methods to problems of forest ecosystem protection and conservation in the United States and Brazil.

E. Ann LeFurgey, Ph.D., *Associate Research Professor*; B.S., Biology, Chemistry, Maryville College; M.S., Ph.D., Marine Sciences, University of North Carolina, Chapel Hill.

Director of the analytical electron microscopy facility in Duke University Medical Center's Department of Cell Biology, Dr. LeFurgey is a cell physiologist with interest in the mechanisms of toxic injury in cells elicited by metals and organic pollutants. Her laboratory is one of few worldwide focusing on the application of quantitative electron probe x-ray microanalysis and imaging to problems in environmental health and toxicology.

Orrin H. Pilkey, Ph.D., *James B. Duke Professor of Coastal Geology*; B.S., Geology, Washington State University; M.S., Geology, Montana State University; Ph.D., Geology, Florida State University.

A professor in the geology department at Duke, Dr. Pilkey studies applications of the principles of coastal geology to developed shorelines and barrier islands. This includes impact of engineering structures and procedures on recreational beaches and determining the feasibility of various alternative responses to shoreline retreat related to rising sea level.

Stuart Rojstaczer, Ph.D., *Associate Professor*; B.S., Geology, University of Wisconsin; M.S., Geology, University of Illinois; Ph.D., Applied Earth Sciences, Stanford University.

Professor in the Department of Geology at Duke, Dr. Rojstaczer is a hydrogeologist. His primary research interest is in the interaction between crustal deformation and subsurface fluid flow. He is also involved in developing new methods to measure the permeability of the earth's crust in situ at a variety of scales.

William H. Schlesinger, Ph.D., *Professor*; A.B., Biology, Dartmouth College; Ph.D., Ecology and Systematics, Cornell University.

Dr. Schlesinger's research interests span the field of global change science, focusing on human induced changes in the global biogeochemical cycles. He maintains an active

program of field research in the southwestern United States, where he examines the causes and consequences of desertification in arid-land ecosystems.

Narendra P. Sharma, Ph.D., *Adjunct Professor*; B.S., Agricultural Economics, University of Hawaii; M.S., Agricultural Economics, Rutgers University; M.E.M., Environmental Management, Duke University; Ph.D., Agricultural Economics and Economic Development, Virginia Polytechnic Institute and State University.

Principal economist at the World Bank in Washington, D.C., Dr. Sharma is the primary author of the bank's forest policy. His research interests are in applied economics, project design and policy analysis. He has worked in developing countries on policy issues related to conservation and sustainable development, poverty, natural resource management, and policy dialogue. His current research focuses on quantification of environmental impacts and local participation.

William R. Sizemore, Ph.D., *Adjunct Professor*; B.S., Forestry, Louisiana State University; M.F., Duke University; Ph.D., Forestry, University of Georgia.

Dr. Sizemore is a principal in Sizemore and Sizemore, Inc., a consulting firm in Tallahassee, Alabama, offering forest appraisal, analysis, and management services. His current research interests relate to the application of general real property appraisal theory and practice to timberland properties.

V. Kerry Smith, Ph.D., *Adjunct Professor*, A.B., Ph.D., Economics, Rutgers University.

Dr. Smith is a University Distinguished Professor at North Carolina State University and a University Fellow for the Quality of the Environment division at Resources for the Future. His current research focuses on modeling how individuals deal with risks (including radon, pesticide residues and cholesterol) that differ in their temporal effects and prospects for mitigation. Other projects investigate the development of recreation values for reducing marine pollution, the measurement of the trade consequences of environmental policy, the incorporation of nonmarket services into measures of GDP, and the calibration of nonmarket valuation methods.

Harold Karl Steen, Ph.D., *Adjunct Professor*; B.S., Forestry, M.F., Ph.D., History of Conservation, University of Washington.

Dr. Steen's current research interests are the political and economic development of modern forestry concepts and policies, and the history of conservation and land use as related to current forest land issues. He is director of the Forest History Society at Duke University.

John J. Vandenberg, Ph.D., *Adjunct Assistant Professor*; B.A., Biology, The College of Wooster; M.S., Ph.D., Biophysical Ecology, Duke University.

Dr. Vandenberg's current research interests are in health risk assessment methodology and application and the evaluation of risk assessment techniques for hazardous air pollutants. He is director of the Research to Improve Health Risks Assessments program in the Office of Research and Development, United States Environmental Protection Agency, Research Triangle Park, N.C.

Carel P. van Schaik, Ph.D., *Associate Professor*; B.Sc., Biology, M.Sc., Ethology and Plant Ecology, Ph.D., Ethology, Utrecht University.

Dr. van Schaik is a tropical ecologist and ethologist with Duke's Department of Biological Anthropology and Anatomy. His ecological research focuses on fungivores in tropical rain forests and their response to resource seasonality and disturbance. He is also interested in strategies of conserving biological diversity.

P. Aarne Vesilind, Ph.D., *Professor*; B.S., M.S., Civil Engineering, Lehigh University; M.S., Sanitary Engineering, Ph.D., Engineering, University of North Carolina at Chapel Hill.

A professor in Duke University's School of Engineering, Dr. Vesilind researches wastewater and sludge management and disposal, and the development of solutions to solid waste and resource recovery problems.

David N. Wear, Ph.D., *Adjunct Assistant Professor*; B.A., Botany, University of Montana; M.F., Resource Systems Science, Duke University; Ph.D., Forest Economics, University of Montana.

Dr. Wear's current research concerns the economics of ecosystem management, the design of forestry policies, and the regional assessment of forest production and investment. He is a research forester with the USDA Forest Service, Southeastern Forest Experiment Station, Research Triangle Park, N.C.

Jonathan B. Wiener, J.D., *Associate Professor*; A.B., Economics, Harvard College; J.D., Harvard Law School.

A member of the Duke law school faculty, Mr. Wiener is interested in the interplay of science, economics, and law in addressing environmental and human health risks. Before coming to Duke, he worked in the area of environmental policy at the White House Council of Economic Advisers and Office of Science and Technology Policy, and at the United States Department of Justice. He also helped organize the environmental component of the "AmeriCorps" national service program.

Robert L. Wolpert, Ph.D., *Associate Professor*; A.B., College Scholar, Cornell University; Ph.D., Mathematics, Princeton University.

A member of Duke's Institute of Statistics and Decision Sciences, Dr. Wolpert is interested in the theory and foundations of statistical inference and in the application of advanced mathematical, numerical and statistical methods to the modeling and study of environmental and biological systems. His current research stresses the study of model selection, model validation, and uncertainty analysis for environmental simulation and risk-assessment models.

Faculty Emeriti

Roger F. Anderson, Ph.D., *Professor Emeritus*

Cazlyn G. Bookhout, Ph.D., *Professor Emeritus*

John D. Costlow, Ph.D., *Professor Emeritus*

George F. Dutrow, Ph.D., *Professor Emeritus*

Benjamin A. Jayne, Ph.D., *Professor Emeritus*

Paul Jackson Kramer, Ph.D., *James B. Duke Professor Emeritus*

James Granville Osborne, B.S., *Professor Emeritus*

William J. Stambaugh, Ph.D., *Professor Emeritus*

James G. Yoho, Ph.D., *Professor Emeritus*



Degrees and Programs of Study



Degrees

Duke University offers undergraduate, professional, and research programs in several areas of study related to natural resources and the environment. A Bachelor of Arts degree with a major in environmental sciences and policy is offered through Trinity College of Arts and Sciences. Master of Environmental Management (M.E.M.) and Master of Forestry (M.F.) degrees are offered by the School of the Environment; and Master of Science, Master of Arts, and Ph.D. degrees are offered in the Department of the Environment of the Graduate School.

The degrees offered through the School of the Environment (M.E.M. and M.F.) are *professional* degrees. They are intended mainly to provide students with the broad education and experience necessary for careers in natural resource and environmental management. The professional degrees emphasize applied science, economics, policy, and quantitative methods of problem analysis and decision making.

The Master of Environmental Management degree is designed to develop expertise in planning and administering the management of the natural environment for maximum human benefit with minimum deterioration of ecosystem stability. M.E.M. degree candidates choose one of six programs of study: Resource Ecology; Environmental Toxicology, Chemistry and Risk Assessment; Biohazard Science; Water and Air Resources; Resource Economics and Policy; or Coastal Environmental Management.

The Master of Forestry degree concentrates on forest and associated resources, including timber, water, wildlife, and recreation and their management from an ecological and economic point of view. The graduate with an M.F. degree is qualified for employment as a professional forester in an administrative or staff position with federal and state agencies, industries, and other organizations concerned with forest and land management. The Forest Resource Management program is offered under the M.F. degree. This program is accredited by the Society of American Foresters.

Students planning careers primarily in teaching and research are urged to follow a course of study in the Graduate School. The *graduate* degrees (M.S., A.M., Ph.D.) emphasize original research in a narrowly defined area of natural resource or environmental science, systems science, economics, or policy. The student interested in one of the graduate degrees should consult the bulletin of the Graduate School for more detailed information.

Individually designed programs of study related to natural resources and the environment are possible under either the professional or graduate degrees, with faculty approval.

Requirements for the Professional Degrees

A total of 48 units is required for either the Master of Environmental Management (M.E.M.) or the Master of Forestry (M.F.) degree. Although a student may fulfill part of the degree requirements through an internship or independent study off campus, he or she must complete at least 36 units and three semesters in residence and pay full tuition for the fourth semester.

Students' programs consist of a combination of regular courses, independent projects, and seminars. A master's project of 4 to 6 units is required of all students. Course work in other departments of the university and at nearby institutions is available to strengthen students' education in special areas.

A full semester load is 12 units, which should ordinarily consist of a combination of regular courses, independent projects, and the master's project. Not more than four regular courses should be taken in a semester. Permission of the student's adviser is required to take more than 15 or fewer than 9 units in a semester.

As students progress in their programs, they are expected to devote an increasing amount of time to the master's project and to register for more independent project units in a semester. Thus, the student should plan to take fewer units of regular courses during the latter semesters of study.

ONE-YEAR MASTER OF FORESTRY OPTION

Students who have an undergraduate degree in forestry may earn a Master of Forestry degree with only 30 units of credit. To be admitted to the one-year degree option, the student must have received a Bachelor of Science in Forestry degree from an accredited forestry school. The student must spend a minimum of two semesters in residence.

Concurrent Degrees

Master of Environmental Management and Master of Forestry. Students desiring to earn both the M.E.M. and the M.F. degree can do so by planning their courses appropriately. The requirements for earning both degrees are as follows:

1. The student must qualify for either the M.E.M. or M.F. degree by earning 48 units of credit under the requirements set forth above.
2. For the second degree, the student must complete an additional 24 units of study composed of courses that would normally be accepted toward the second degree. Two additional semesters in residence are normally required.

Determination of eligibility for the degrees will be made on an individual basis and will consider the educational background and objectives of the student.

Master of Business Administration. The techniques of management science are applied with increasing frequency in the management of natural resources, and they are also now commonly used in the analysis of environmental problems. To integrate training in these management techniques more effectively into the curriculum, the School of the Environment has developed a cooperative arrangement with Duke's Fuqua School of Business. Three years of study are required to earn the combined degrees of Master of Environmental Management/Master of Business Administration or Master of Forestry/Master of Business Administration. Normally, at least 36 units of credit within the school are required to receive the M.E.M. or M.F. degree. A typical program sequence would involve spending the first year in the School of the Environment followed by a year in the Fuqua School of Business and concluding with the final year of combined work in both schools.

These concurrent degrees stress concepts, analytical reasoning, and the basic methodologies of management science, while providing the student with a knowledge of current problems in the natural resource industries. Managerial economics, resource economics, organization theory and management, accounting, information and control, resource management, the legal environment, and public policy aspects of resource industries form a substantial component of each degree.

Because of the academic demands of these degrees, those entering without the necessary analytical skills or life science background may be required to take additional work beyond that specified.

Students who wish to undertake both the Master of Environmental Management or Master of Forestry and Master of Business Administration degrees must apply to and be accepted by each of the respective schools. For information on the Master of Business Administration degree, the prospective student should write to the Fuqua School of Business, Admissions Office, Duke University, Box 90104, Durham, N. C. 27708-0104.

Master of Public Policy. As issues concerning natural resources and the environment have become of increasing significance to the nation, there has developed a corresponding need for well-trained policy analysts who can provide timely and appropriate information and analysis to resource policy makers. To meet this need a unique concurrent degree has been developed in cooperation with the Terry Sanford Institute of Public Policy. Students pursue a Master of Environmental Management or Master of Forestry degree and a Master of Public Policy. Doctoral candidates in forestry and the environmental sciences are also eligible to undertake the Master of Public Policy.

The concurrent degree normally takes two and one-half years to complete. The first year is devoted to study in the School of the Environment, and the second year is spent in the Institute of Public Policy. The final semester involves work in both areas. Normally, at least 36 units of credit within the school are required to receive the M.E.M. or M.F. degree. A summer internship with a resource or environmental agency, or with a related legislative, judicial, or interest group, is required for the policy degree.

This degree provides training in the politics and economics of resource and environmental policy making. Emphasis is placed on understanding the social and political forces involved, developing facility with quantitative and logical methods of forecasting, and evaluating policy consequences. Knowledge of the uses and limitations of policy analysis and an awareness of the ethical dimensions of policy choice are also stressed.

Students must apply to and be accepted by both the School of the Environment and the institute. For detailed information on the public policy degree, write to Director of Graduate Studies, Terry Sanford Institute of Public Policy, Duke University, Box 90240, Durham, N. C. 27708-0240.

Juris Doctor in Environmental Law. Environmental and natural resource issues increasingly require legal and regulatory knowledge for resolution. There is a growing demand for resource managers and scientists who have legal credentials; similarly, attorneys are facing more situations in which knowledge of natural resources and the environmental sciences is critical to the resolution of disputes. To satisfy these demands, the School of the Environment and the School of Law have developed a cooperative arrangement to allow pursuit of concurrent Master of Environmental Management or Master of Arts and Juris Doctor degrees.

For students in the concurrent M.E.M./J.D. program, the School of the Environment requires 36 units of credit to be taken within its own programs and allows 12 units of credit for courses taken in the law school. The School of Law requires 74 units of law credit and awards 12 units for work done in the School of the Environment.

Typically, a student will complete the first year of study in the School of Law and the second in the School of the Environment. During the third year, the student will take 6 units of course work each semester in the School of the Environment while principally registered as a student in the School of Law. M.E.M./J.D. candidates must apply to and be accepted by both the School of the Environment and the School of Law.

For students in the concurrent A.M./J.D. degree, 24 units of credit are required in the Department of the Environment of the Graduate School and 74 units in the School of Law. Further information is available from the director of graduate studies.

For information on the law degrees, prospective students should write to the School of Law, Admissions Office, Duke University, Box 90393, Durham, N. C. 27708-0393.

Other Concurrent Degrees. With the special permission of the education committee and the dean of the School of the Environment, students are permitted, on an individual basis, to establish concurrent degree programs with certified graduate degree programs

either within or outside of Duke University. In the past, students have designed such programs with law schools, business schools, and graduate engineering programs. As with the other concurrent degrees, the student must be enrolled in the Master of Environmental Management or Master of Forestry degree program for 36 units of credit and in residence for at least one full year.

To gain acceptance of a specially designed concurrent degree, the student must show an official acceptance from another certified graduate degree program. In order to receive the M.E.M. or M.F. degree, the student must have completed 36 units of credit, the master's project, all program area requirements, and at least one full year of study in the other degree program (with an official transcript of work completed). For additional information concerning special concurrent degrees, applicants should consult the Office of Enrollment Services.

Degrees in the Graduate School

In addition to the professional degrees (M.E.M. and M.F.) described earlier, Duke University offers the Master of Arts (A.M.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees in forestry, environmental studies, and marine sciences. These degrees are administered by the Graduate School of the university; however, the bulk of the instruction, research, and advising connected with them takes place in the School of the Environment. Qualified faculty members of the School of the Environment comprise the faculty of the Department of the Environment of the Graduate School.

Degrees in the Graduate School are appropriate for students desiring to concentrate their study and research within a well-defined subject area. Students usually pursue fewer and more advanced topics to a greater depth than do students in professional degree programs. Thus, study in the Graduate School is more appropriate for students preparing for careers in teaching or research in specialized areas, while the broader approach characterizing professional education is more appropriate for students preferring careers in natural resource and environmental management.

Graduate School students emphasize research as major parts of their degree programs. An active research program is a vital component of the School of the Environment, and most of the research projects in the school utilize graduate students as research assistants.

Qualification of Students. Students seeking admission to the Graduate School must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. Usually the student should have majored in the area of intended graduate study or one closely related to it. Some work in science and mathematics is essential; however, the total undergraduate education should be well-rounded. Because research is such an integral part of graduate education and of the school's mission, the student's undergraduate record must evidence the capability and motivation to carry out independent study and research at an advanced level.

Policy and Procedures. Policy and procedures for admission, general requirements for degrees, registration, and academic regulations are given in detail in the bulletin of the Graduate School and are not repeated here. In general, procedures, requirements, and regulations are similar in the Graduate School and in the School of the Environment. Some differences are noted below.

Admission. Applications for admission to A.M., M.S., and Ph.D. degree programs should be obtained from and returned to the dean of the Graduate School, Duke University, Box 90063, Durham, N. C. 27708-0063. However, inquiries about programs of study and research should be sent to the director of graduate studies, School of the Environment. On request, the director of graduate studies will arrange to have application materials sent to the applicant.

All applicants for degrees in the Graduate School will have their files screened by the faculty of the Department of the Environment of the Graduate School. One of the faculty members must accept responsibility for advising the applicant before admission can be offered.

The priority application deadline is December 31. Applications postmarked after this deadline will not be considered until all on-time applications have been processed. Applications received by December 1 require a \$50 application fee, as opposed to \$65 for those received after that date.

GENERAL REQUIREMENTS FOR THE MASTER'S DEGREES

Residence Requirements. Candidates for A.M. or M.S. degrees must spend, as a minimum, one full academic year (two successive semesters), or its equivalent in summer sessions, in residence at Duke University. Thirty units of graduate credit constitute minimum enrollment for a master's degree. Additional time to complete course and research requirements is frequently necessary.

Transfer of Graduate Credits. A maximum of 6 units of credit may be transferred for graduate courses completed at other institutions. Consult the bulletin of the Graduate School for details.

The Thesis. A thesis is required of M.S. degree candidates but is optional for A.M. candidates. The thesis must indicate the student's ability to collect, arrange, interpret, and report pertinent material on a research problem. Although a publishable document is not required, the thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures.

The Examining Committee and the Examination. The faculty member who directs the student's program recommends an examining committee composed of him or herself and two other members of the graduate faculty, one of whom usually must be from another department. The committee conducts an examination based on the student's general program and the thesis.

Language Requirements. There is no language requirement for A.M. or M.S. degree candidates in the Department of the Environment.

Major and Related Subjects. The student must present acceptable grades for a minimum of 24 units in graduate courses. Of these, at least 12 units must be in the Department of the Environment. A minimum of 6 units must be in a minor subject or in related fields approved by the department and by the dean of the Graduate School. A maximum of 6 units may be earned by submission of an approved thesis.

GENERAL REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

The Ph.D. is a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for receiving the doctorate. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

Requirements. The formal requirements for the Ph.D. degree are as follows: (1) major and related courses, (2) foreign language, (3) a supervisory committee for program of study, (4) residence, (5) preliminary examination, (6) dissertation, and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passing grades in all courses.

Major and Related Courses. The student's program of study demands substantial concentration on courses in the department. However, a minimum of 6 units in a related field approved by the department must be included.

Foreign Language. Ph.D. candidates in the Department of the Environment are not ordinarily expected to have a reading knowledge of a foreign language. However, on recommendation of the student's supervisory committee, knowledge of one or more languages may be required.

Supervisory Committee. As early in a student's course of study as is practicable, and not later than two months before the preliminary examination, the director of graduate studies will nominate for the approval of the dean a supervising committee consisting of five members, with one member designated as chairman. This committee will include at least three graduate faculty members from the department and at least one from outside the department. This committee, with all members participating, will determine the program of study and administer the preliminary and final examinations. Successful completion of the final examination requires four affirmative votes. The final examination may be administered by four members if the representative of the related field is present.

Residence. The minimum registration requirement is 60 units of graduate credit, of which not more than 15 units may be accepted by transfer. The minimum registration per semester is 12 units. The minimum full-time residence requirement is one academic year (two consecutive semesters) at Duke. All Ph.D. candidates must register for a full course load until they have completed the required 60 units of graduate credit. Those entering with undergraduate deficiencies may be required to take undergraduate courses for which they will not receive degree credit. The student's supervisory committee will determine what requirements above the minimum, if any, the student must meet. More complete information and requirements for the preliminary examination, the dissertation, and the final examination are outlined in the bulletin of the Graduate School.

Program in Marine Sciences

The mission of The University Program in Marine Sciences is: (1) to unify Duke's considerable ocean science resources located on both the Durham and Beaufort campus into a coherent university research and education program; (2) to provide a process oriented core curriculum in the ocean sciences for undergraduate, professional and graduate students; (3) to promote high quality research in the ocean sciences by attracting new research programs and by providing resources to ensure the success of those programs; (4) to provide education in basic ocean processes and the human effects on those processes; (5) to coordinate education and training opportunities in the ocean sciences at Duke so that these might be made more readily available within and outside the university; (6) to encourage progress in the ocean sciences through cooperation among researchers in varied disciplines worldwide.

Although the program does not grant degrees, it offers a course of study for students interested in oceanography (biological, chemical, geological and physical), marine biology, the marine environment and human health, and coastal resource management. It also provides financial and facilities support for students in the Graduate School.

Students have the opportunity to live and study at the Duke University Marine Laboratory for full academic years—fall and spring semesters—and summer terms. The program emphasizes small class size, independent research, and integrated classroom, laboratory, and field experience. Students have daily access to a specialized faculty, modern scientific equipment, and the surrounding natural marine environment. The summer curriculum, taught in three five-week terms, includes a rich assortment of courses in the natural sciences.

Students wishing to apply for the fall or spring semester must submit an application form containing the written approval of their faculty adviser to the Marine Laboratory admissions office prior the Duke's registration period for the desired semester. Students

will be notified of the action of the admissions committee shortly after receipt of their application. Late applications will be considered if space is available.

Applications for summer terms must contain the written approval of the student's adviser or dean and should be submitted by the end of March or earlier. Thereafter, applications will be considered if space is available. Students wishing to attend the first summer term (May-June) should submit their applications well in advance to ensure placement in their course of first choice. A number of summer tuition scholarships are available on a competitive basis.

Further information on the Program in Marine Sciences, courses schedules, admissions procedures, and financial assistance may be obtained from the Admissions Office, Duke University School of the Environment Marine Laboratory, 135 Duke Marine Lab Road, Beaufort, N. C. 28516-9721; telephone (919) 728-2111.

Undergraduate Degree in Environmental Sciences and Policy

An undergraduate major in environmental sciences and policy is offered within the Bachelor of Arts degree to students interested in the interdisciplinary study of environmental issues. The major permits students to combine studies in the natural sciences and engineering with courses in the social sciences and humanities around general focus areas and themes. The major is specifically designed for students with career objectives such as environmental law, policy, management or planning that require an understanding of environmental issues that cross traditional disciplinary boundaries. Courses for the major are taught by more than sixty Duke professors in nineteen cooperating departments and schools.

Students interested in the Environmental Sciences and Policy Program should consult the Duke University bulletin of undergraduate instruction, available from the Office of Undergraduate Admissions, for further information. The program is administered through Trinity College of Arts and Sciences; Dr. Randall A. Kramer, a member of the School of the Environment faculty, serves as director.

Nondegree, Special Status

Persons interested in pursuing graduate or professional studies in natural resources not leading to a degree may apply for nondegree, special status. Such students may take from 3 to 12 units of course work each semester; they are registered with the university as a student with appropriate privileges and they receive transcripts of work completed for each semester in residence. If the student later applies for admission into a regular degree program, some of the courses may count toward the degree. Students wishing to study for only one or two semesters or to do postdoctoral work should apply for nondegree, special status. Additional requirements are contained in a later section on admissions.

Professional Programs



In the School of the Environment, emphasis is placed on maintaining the highest standards of scholarship and on relevance to contemporary needs in natural resources study and research.

The school emphasizes three broad conceptual areas in its instruction and research: applied resource science, resource economics and policy, and quantitative methods. Regular courses, intensive courses, seminars, and special studies are offered in each of the three areas. Preparation for professional employment requires a higher degree of specialization than is characterized by this framework, however. Hence, seven programs of study have been designed by the faculty to assure professional competence in some aspect of natural resources while offering adequate breadth of educational experience. One of these programs, Forest Resource Management, is offered under the Master of Forestry degree. The remaining six—Resource Ecology; Environmental Toxicology, Chemistry, and Risk Assessment; Biohazard Science; Water and Air Resources; Resource Economics and Policy; and Coastal Environmental Management—are offered under the Master of Environmental Management degree.

Each program can be used as a foundation for obtaining the A.M., M.S., and Ph.D. degrees.

Qualified students who have interests outside of the structured programs are permitted to design individual programs of study. Pursuit of an individual program requires preparation of a comprehensive statement of objectives and specification of each of the program components: major courses, quantitative courses, seminars, electives, and a master's project. All individual programs of study are subject to approval by the education committee. Students who wish to pursue an individual program of study must request approval of their program by the end of their second semester of enrollment.

Program Requirements

Each of the school's professional programs requires the completion of 48 units of credit. These units are distributed among a set of core courses constituting the major, quantitative courses, electives, a master's project, and seminars relevant to the program's objectives. These broad categories are discussed briefly below, and major (core) courses are listed for each program. More specific information about requirements for any one of the programs can be obtained from the Office of Enrollment Services.

Major courses. Each program requires a series of core courses in the major area of study. These courses are specified or, in some cases, elective within the limits of the program emphasis.

Quantitative and Analytical Courses. All programs require 6 to 12 units in quantitative and analytical methods related to natural resource analysis, modeling, and management.

Elective Courses. Elective courses are available to give the student flexibility in developing his or her course of study. These credits are used to add depth to the major area of study or to develop a second area of expertise. Students who select the Resource Economics and Policy program and who have not had previous training in a natural resource area must use at least three of their elective courses to meet this requirement.

Master's Project. A master's project constituting 4 to 6 units of credit is required. These projects take the form of individual or small group research efforts related to some area of natural resource management.

Seminars. All students are required to participate in seminars in their program area for 1 unit of credit. During the spring semester of their second year in residence, students present the results of their master's project in a school-wide symposium.

Forest Resource Management

The Forest Resource Management program integrates the biological and physical components of forest productivity with methods of modern business management. The program builds knowledge in basic forest ecology and integrates this knowledge with foundations in planning and administration for the production of a wide range of forest resources, including environmental quality. This distinctive approach is brought about by close coordination of resource inventory course work; resource oriented courses such as soils, silviculture, timber production, forest protection, and tree physiology; management oriented courses such as operations research, modeling, and ecosystem analysis as applied to research and development; and courses in resource economics and policy.

The program emphasizes the use of computer based, quantitative techniques to facilitate decisions on the selection of management options to achieve objectives. Various methods of analysis are applied to all forest resources in order to optimize production within the constraints imposed by biological, physical, and economic conditions.

The central focus of the Forest Resource Management program is problem solving in complex ecologic and management systems. Within the program, students have the flexibility to gain depth in an area of specialization. Consequently, students may acquire skills that qualify them for a variety of positions in forest products industries, government agencies, nonprofit organizations, and other groups concerned with the management, utilization, and protection of forests. The program can provide an excellent foundation for the Ph.D. and a career in research. Students who complete this program and also complete a Master of Business Administration degree in the Fuqua School of Business have particularly strong credentials for employment in private industry.

Forest Resource Management is offered under the Master of Forestry degree. Students in the program select a concentration in forest ecology or forest economics/business. Students may use electives and additional course work to accommodate a second emphasis in another program area within the school.

This program is accredited by the Society of American Foresters, which is recognized by the Council on Postsecondary Accreditation and the Department of Education as the accrediting body for forestry in the United States.

Core Courses. ENV 201. Forest Resources Field Skills; ENV 204. Forest Inventory, Growth and Yield; ENV 205L. Ecological Management of Forest Systems (Silviculture); ENV 213. Forest Ecosystems; ENV 270L. Resource and Environmental Economics; ENV

316. Case Studies in Environmental and Forest Management; plus one additional course in each of three broad categories—principles, practices, and management.

Resource Ecology

The Resource Ecology program is concerned with the application of ecological theory to the management of terrestrial and aquatic resources and ecosystems. An integrated management scheme is advocated; that is, one which takes into account natural science as well as economics, ethics, and political realities.

The framework for the development of management guidelines is provided by these general ecological mandates: the recognition of a hierarchical order of study (organism, population, community, and ecosystem); the understanding of connections among ecosystems and ecosystem processes; and the maintenance of ecosystem integrity for future generations.

The applied thrust of the program allows the student to anticipate as well as to answer questions about environmental management problems. Problem solving is based on the best possible scientific description and interpretation of ecological processes and analysis of appropriate data bases. Applied ecology recognizes the needs of environmental managers and provides an organizing framework for information to help minimize resource use conflicts.

A strong background in quantitative methods is required of students in this program, as it is for other programs offered by the school. Mathematical and conceptual models are invaluable in clarifying environmental problems. They are essential to describe basic biophysical and biochemical processes, to test hypotheses, and to predict and model the response of ecosystems to management and disturbance.

The specific objective of the Resource Ecology program is to train professionals for management or research positions with state or federal natural resource agencies, regional planning bodies, resource development companies, and consulting firms. Graduates of the program have practical experience with the analysis of ecological problems such as ecosystem management and conservation, flooding, disturbance of wetlands, integrated pest management, soil conservation, and mining reclamation.

Resource ecology is offered under the Master of Environmental Management degree. Majors in the program select an area of concentration. Examples include aquatic/wetlands ecology, conservation biology, forest ecology, landscape ecology, or quantitative ecology. Students may use electives and additional course work to accommodate a second emphasis in another program area within the school.

Core Courses. Ecology courses are required at the ecosystem—community, population, and organismal—level of biological organization; ENV 270L. Resource and Environmental Economics; ENV 316. Case Studies in Environmental and Forest Management.

Environmental Toxicology, Chemistry, and Risk Assessment

The Environmental Toxicology, Chemistry and Risk Assessment program (ETCRA) is concerned with the fates, effects, and risks of pollutants to natural ecosystems and human users of those systems, as well as linkages between ecological and human health. ETCRA is a multidisciplinary program incorporating the concepts, information bases, and methodologies of ecology, toxicology, environmental chemistry, and risk assessment. The goal of the program is to produce environmental managers with a solid foundation in the principles underlying pollutant fates and impacts, as well as a firm grasp of state-of-the-art approaches for evaluating specific instances of environmental contamination and for making management decisions based upon quantitative analysis.

Duke offers exceptional opportunities for training in environmental toxicology, chemistry, and risk assessment. Ecotoxicology is a key component of the university-wide Integrated Toxicology Program. Additionally, the ETCRA curriculum is enhanced by

resources of sister universities in the Research Triangle area (particularly the University of North Carolina at Chapel Hill and North Carolina State University) and institutions within the Research Triangle Park, such as the Environmental Protection Agency, the National Institutes of Environmental Health Sciences, and the Chemical Industries Institute of Toxicology.

Environmental Toxicology, Chemistry and Risk Assessment is offered under the Master of Environmental Management degree. Students in the program are required to take a common core of courses that includes environmental toxicology and chemistry, ecology, environmental economics and policy, and statistics and risk assessment. Additionally, students are encouraged to develop a concentration in one of three specializations: environmental toxicology, environmental chemistry, or environmental risk assessment.

Core Courses. ENV 212. Environmental Toxicology; ENV 240. Fate of Organic Chemicals in the Aquatic Environment or ENV 242. Environmental Aquatic Chemistry; one course in ecology; and one course in environmental economics, policy, or law. Students must also take ENV 385. Decision Theory and Risk Analysis and one course in statistics.

Biohazard Science

The Biohazard Science Program is concerned with the impact on human health of hazardous materials in the occupational and environmental setting. Emphasis is placed on biological agents and their products, although consideration is given to chemical, physical, and ergonomic stressors in the workplace. The curriculum encompasses the principles and practices of microbiology, infection control, occupational and environmental medicine, environmental health, toxicology, industrial hygiene, ergonomics, health physics, risk assessment, hazard control, law, and safety management.

The goal of the program is to produce safety professionals possessing the ability to identify and assess workplace and environmental hazards and to develop strategies for the prevention, control, or mitigation of potentially hazardous situations. Graduates will be aware of regulatory mandates and community standards related to the occupational setting and the environment. They will understand the influence of legal, ethical, and management issues on the provision of a safe and healthy workplace and on the preservation of the environment.

Biohazard Science is an interdisciplinary program between the Duke School of the Environment and the Division of Occupational and Environmental Medicine, Department of Community and Family Medicine, Duke University Medical Center. Duke offers exceptional opportunities for training in biohazard science, occupational and environmental medicine, toxicology, ecology, the biological sciences, and chemistry. Additionally, the Biohazard Science curriculum is enhanced by resources of universities in the Research Triangle area (particularly the University of North Carolina at Chapel Hill and North Carolina State University) and government and private organizations within the Research Triangle Park.

Biohazard Science is offered under the Master of Environmental Management degree. Students enroll in the first summer session after their first year of study in order to complete ENV 341L, Methods in Biohazard Science. The remainder of the summer is devoted to an approved practicum.

The Division of Occupational and Environmental Medicine and the School of the Environment have developed internship and practicum opportunities with various federal agencies, nonprofit public interest groups, the Duke University Environmental Safety Office, trade organizations, and industry. Alternatively, some students may engage in research with faculty advisors in areas such as indoor air pollution, infectious diseases, hazardous waste management, bioremediation, biocidal materials, and epidemiology.

Core Courses. ENV 246. Survey of Occupational Health and Safety; ENV 247. Survey of Environmental Health and Safety; ENV 340. Biohazard Science; ENV 342. Bioaerosols; ENV 343. Hazard Management, Law and Ethics; and one course in toxicology. Students must also take ENV 341L. Methods in Biohazard Science and one course in each of the following topic areas: biostatistics and epidemiology.

Water and Air Resources

The program in Water and Air Resources enables students to obtain a scientific understanding of the basic physical and chemical processes affecting these natural resources and trains students to apply this understanding, together with quantitative, analytical and statistical techniques, to the management of these resources. Emphasis is placed on understanding the effects of land resource management on water quality, water quantity and transport, water and atmospheric chemistry, turbulent transport, and air pollution.

Course work and other training in the program cover basic physical and chemical processes relevant to hydrologic and atmospheric sciences, methods of quantitative and statistical analysis, and methods of management and decision making. The basic processes emphasized are those concerned with watershed hydrology; stream and lake water quality; water and atmospheric chemistry; general meteorology and climatology; and the origins, transport, and fate of aquatic and atmospheric pollutants. Quantitative analysis techniques include statistical methods, probabilistic and deterministic models, and optimization and simulation methods. These courses are integrated with others in water resource management, air resource management, and economic analysis.

Graduates of the program have the skills to become analysts or consultants for private industry and public agencies concerned with the management and protection of water and air resources. These employers include government agencies, public utilities, fuel and ore extraction companies, consulting firms, and hydrologic, atmospheric, or environmental research centers.

Water and Air Resources is offered under the Master of Environmental Management degree. Majors in the program can select an areas of concentration: water resources, air resources, or a combination of water and air resources. Students may use electives and additional course work to accommodate a second emphasis in another program area within the school.

Core Courses. At least one course from among those approved in each of four areas: physical sciences, chemical sciences, biological or ecological sciences, and social sciences; plus three additional courses in the area of concentration.

Resource Economics and Policy

Society long has had laws and institutions aimed at regulating the use of natural resources such as forests, wetlands, wildlife, water, and minerals. During the past few decades, new institutions have been developed to deal with problems of water and air pollution, toxic substances, and related areas of environmental degradation. These institutions demand a professional who has the necessary expertise to staff both public and private decision-making bodies.

The Resource Economics and Policy program is designed to train decision makers and those who advise them. The program emphasizes the basic methods needed by the professional for analyzing existing policy and for testing the possible outcome of new environmental and resource policy being considered by public and private agencies. The program is highly analytical and is oriented toward the analysis of contemporary national and international environmental problems.

Decision making in natural resource and environmental policy requires mastery of three broad areas of knowledge: the basic sciences pertaining to a natural resource or an environmental phenomenon; the relevant disciplines in the social sciences; and the

quantitative methods required for using knowledge from the physical, biological, and social sciences to arrive at a decision.

Courses relevant to renewable and nonrenewable natural resources may be part of the student's educational background or may be planned as part of the master's degree. For the natural resource decision maker, the most important social sciences are resource and environmental economics, political science, and legal analysis. Economics includes environmental economics, the economics of public goods and externalities, public finance, and the intertemporal allocation of natural resources. Political science includes the behavior of administrative agencies, regulatory agencies, and legislative bodies. Legal analysis emphasizes the allocation of resources as reflected in property rights and environmental risks as reflected in torts. Quantitative methods, an essential component of this program, includes statistical inference, methods of optimization, and benefit-cost analysis.

Resource Economics and Policy is offered under the Master of Environmental Management degree. Students may use electives and additional course work to accommodate a second emphasis in another program area within the school. Specializations are also available in international environmental policy, marine policy, and coastal zone management policy.

Core Courses. ENV 270L. Resource and Environmental Economics; ENV 274. Resource and Environmental Policy; and one of the following—LAW 241. Environmental Law (UNC); LAW 327. Environmental Law (Duke); or ENV 299.10 Resource and Environmental Law.

Doctoral Program. Students accepted for a doctoral program in resource economics and policy must have significant previous training in economics or another social science. Doctoral candidates in resource and environmental economics must take substantial course work in Duke's Department of Economics and pass the department's preliminary examinations in economic theory. Doctoral candidates in resource and environmental policy must take substantial course work in political science, public policy or political economy in relevant departments at Duke or cooperating universities.

Coastal Environmental Management

The Coastal Environmental Management program provides a scientifically rigorous understanding of global, national, and local physical and biological coastal environments and processes and the human behaviors and policies that affect, and are affected by, those environments and processes. The specific aim of the program is to train scientifically informed professionals to fill coastal policy and management, research, or advocacy positions in federal and state agencies, industry, consulting firms, and non-profit organizations. The program also provides a firm foundation for future Ph.D. studies.

The first year of the program is spent on the Durham campus fulfilling the required courses in areas such as natural resource economics, general environmental policy, ecology, and methodological skills. The second year is spent in residence at the Marine Laboratory in Beaufort taking courses in the natural, social and policy sciences specific to the coastal and marine environment, and focusing on the production of the master's project. The Marine Laboratory provides an ideal setting for the study of natural and social scientific phenomena in the coastal and marine environment, and for interaction with coastal and marine constituencies and policy makers in the application of science to policy. Potentials for participation in the policy-making process are emphasized throughout the program.

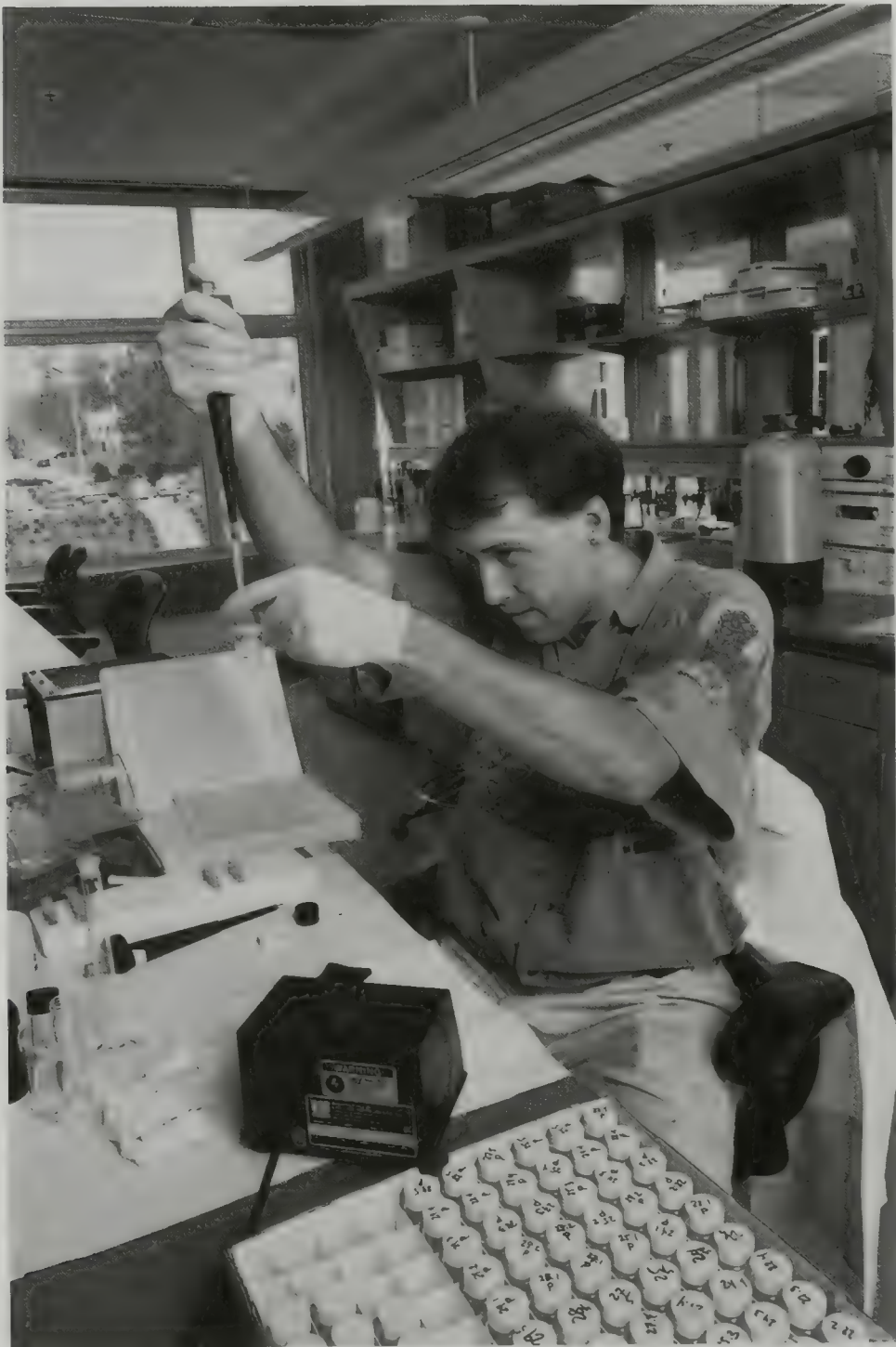
The Coastal Environmental Management program is offered under the Master of Environmental Management degree. Students may specialize in either coastal sedimentary or biological processes. Both specialty tracks provide an educational background in oceanography and coastal ecosystems and in natural resource and environmental

policy as it applies to coastal and marine issues. Students may use electives and additional course work to accommodate a second emphasis in one of the other program concentrations offered within the school.

Core Courses. One ecology course; ENV 270L. Resource and Environmental Economics; one course in marine or environmental policy; and ENV 393. Professional Writing. For a concentration in Coastal Sedimentary Processes, students take either ENV 291S. Geological Oceanography or GEO 206S. Principles of Geological Oceanography, and one course in physical oceanography, biological oceanography, or chemical oceanography. For a concentration in Coastal Biological Processes, students take either ENV 292L. Biological Oceanography or ENV 293. Analysis of Ocean Ecosystems, and one course in physical, geological, or chemical oceanography.



Admissions



Professional Versus Graduate Programs

The student contemplating study at Duke in natural resources and the environment enters either the School of the Environment or the Graduate School depending on the choice of degrees. The professional degrees, consisting of the Master of Environmental Management (M.E.M.) and Master of Forestry (M.F.), are administered by the School of the Environment. Students wishing to earn either of these professional degrees should apply directly to the school. Those preferring to earn a Master of Science (M.S.), Master of Arts (A.M.), or Doctor of Philosophy (Ph.D.) degree should apply to the Graduate School. This chapter describes application to School of the Environment professional degree programs.

Admission to the School of the Environment

The School of the Environment welcomes applications from men and women of all backgrounds who seek an intellectually challenging education designed to prepare them for leadership in a wide variety of natural resource and environmental careers. The programs do not require previous study in forestry or the environmental sciences. However, they are designed primarily for students with a degree in one of the natural or social sciences (including chemistry, biology, physics, economics, earth sciences, environmental sciences, mathematics, and political science) or a preprofessional area such as forestry, engineering, or business.

Admission is open to men and women who hold a bachelor's degree from an accredited college or university or who have completed at least three years of study in an institution participating in the Cooperative College Program. Admission as a special or nondegree student may also be granted under appropriate circumstances.

Prerequisites. Students admitted to the school are expected to have had at least one introductory course in calculus, statistics and microeconomics, and to have a working knowledge of microcomputers for word processing and data analysis. They are also expected to have had some previous training in the natural sciences or the social sciences related to their area of interest in natural resources. Some programs require additional preparation beyond these general prerequisites. For students who select either the Resource Ecology or the Forest Resource Management program, previous training must include an introductory course in ecology. Students who specialize in Environmental Toxicology, Chemistry, and Risk Assessment should have significant undergraduate education in biology and chemistry; a course in organic chemistry is required. Students who specialize in Coastal Environmental Management should have an undergraduate

course in biology, chemistry and physics. Students who specialize in Biohazard Science should have undergraduate training in the microbiological sciences and chemistry. Undergraduate training in chemistry is recommended for students specializing in Water and Air Resources.

Although students without the level of preparation described above may be accepted for admission, it is expected that deficiencies will be made up prior to entrance by means of formal course work, independent study, or other arrangements agreed upon by the applicant and the school. A limited number of deficiencies may be made up during the first year of residence; however, these courses will not count toward the 48 units of credit required for the M.E.M. or M.F. degree.

Admission Criteria. Admission to the School of the Environment is highly selective. Academic performance as an undergraduate, scores on the Graduate Record Examination, and full-time work experience are the primary factors. Recommendations, the statement of educational goals, extracurricular activities, part-time and summer work experience, and other information requested on the application also provide a basis for selection.

The admissions committee considers each applicant as an individual. It attempts to evaluate each candidate for his or her academic potential, professional promise, and ability to benefit from and contribute to the goals of the school.

Application Procedures. Application for admission to the Master of Environmental Management and the Master of Forestry degrees is made through the Office of Enrollment Services of the School of the Environment. All correspondence should be addressed as follows: Office of Enrollment Services, School of the Environment, Duke University, Box 90330, Durham, N. C. 27708-0330.

Except in unusual circumstances, students are admitted only at the beginning of the fall term. The application deadline is 15 February preceding the fall in which admission is desired. Because the school processes applications from more qualified students than it can admit, early submission of applications is recommended and no guarantee is made that applications received after the 15 February priority deadline will be considered.

Students who, because of unusual circumstances, wish to begin their studies in January should complete their application no later than 15 October prior to their matriculation. It should be noted that financial awards are allocated to students beginning in the fall, and few awards will be considered for January applicants.

Each applicant must submit the following before action can be taken:

1. application form;
2. two copies of transcripts from each undergraduate and graduate school attended;
3. three letters of recommendation;
4. scores on the general (verbal, quantitative, and analytical) test of the Graduate Record Examination, taken within the last five years;
5. financial aid form;
6. a nonrefundable application fee of \$65.
7. certificate of financial responsibility and TOEFL scores, if the applicant is an international student;
8. undergraduate dean's approval for students applying through the Cooperative College Program.

Application Forms. No applicant will be considered until the completed application form and all related documents are received by the Office of Enrollment Services. The admissions committee attaches considerable weight to the statement of educational objectives submitted by the applicant. This statement should reflect well-defined moti-

vation to pursue graduate study. The school is particularly interested in applicants who show leadership potential in the broad field of natural resources and the environment. Applicants are expected to demonstrate the maturity and sense of purpose essential to a demanding educational experience, including a concept of the value of professional education to the applicant's career plans and expectations.

Transcripts. Two copies of official transcripts of all undergraduate and graduate study should be sent directly to the Office of Enrollment Services by the registrar of each institution attended.

Letters of Recommendation. Each applicant is required to arrange for the submission of three letters of recommendation, preferably on the form supplied with the application. These recommendations provide the admissions committee with evaluations of the applicant's past performance in academic and employment related situations. Although recommendations from any source are acceptable, at least one job related recommendation and one from a college instructor or administrator are desirable.

Graduate Record Examinations. All applicants for degree programs must take the general test (verbal, quantitative, and analytical) of the Graduate Record Examination (GRE). Subject tests are not required. For scores to be considered, the GRE must have been taken within five years of the date of application. The GRE is administered by the Educational Testing Service at locations throughout the world. Applicants are urged to take the exam at the earliest convenient date. Scores on tests taken later than December may not reach the school until after the 15 February priority deadline. Scores should be reported to Duke University code number 5156. Registration forms may be obtained by writing to GRE, Educational Testing Service, Princeton, N. J. 08540.

Financial Aid Form. All applicants are expected to complete the financial aid form supplied with the admissions packet. Part 1 of this form indicates whether the applicant is requesting financial aid; part 2 indicates the student's financial need if aid is requested. The application for financial aid has no bearing on admission decisions. Academic criteria are the only standards used to determine admission into the professional or graduate degree programs.

Application Fee. A nonrefundable application fee of \$65 is required of all applicants. A personal check, money order, or cashier's check made payable to Duke University is acceptable. Applications will not be officially received or processed until the required fee has been paid.

Additional Procedures for International Students. Each year the School of the Environment welcomes a number of international students among its professional and graduate candidates. Applicants from other countries must meet the same criteria as applicants from the United States. All academic transcripts and other documents in support of admission must be accompanied by an official translation if the original document is not in English. The nonrefundable application fee of \$65 (U.S.) must accompany the application. Applicants must have a fluent command of oral and written English. No allowance is made for language difficulty in arranging course schedules or in evaluating performance.

If the native language is not English, the applicant must submit scores on the Test of English as a Foreign Language (TOEFL) to be considered for admission. All arrangements for taking the TOEFL must be made directly with the Educational Testing Service, Box 899, Princeton, N. J. 08540.

All foreign Graduate School students whose native language is not English will be tested during their first registration period for competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack necessary

competence should be prepared to assume all costs for being tutored in English and should reduce their course or research program by 3 units while being tutored. Students who do not successfully pass the test for competence in the use of oral and written English by the end of their first year of residency will not be permitted to continue their graduate work at Duke University.

The visa-granting authority in the student's country of origin, ordinarily the United States Embassy, requires proof that sufficient funds are available to the student to cover the expenses of all academic years of study before a visa can be granted. Foreign students are not eligible for federal and state loans, although they may qualify for certain educational loans through private United States agencies. Current immigration laws make it extremely difficult for the foreign student to find summer employment and permanent employment in the United States after graduation.

Interviews. An interview with a member of the admissions committee is not required but may be helpful to the applicant as well as to the school. Consequently, those applicants who can visit the school are encouraged to do so. The visit presents an excellent opportunity for the applicant to ask questions, gain insight into the school, and bring items of concern to the attention of the admissions committee. Applicants are encouraged to allow sufficient time to visit classes, meet students and faculty, and tour the university.

In general, visits can be scheduled on weekdays throughout the academic year. Appointments should be made at least two weeks in advance. Although visits during the summer months are possible, they should be scheduled well in advance since no summer classes are taught and faculty are frequently away from campus.

Each year faculty or other representatives of the school travel throughout the country to visit undergraduate schools. Applicants from the cooperative colleges should check with their program adviser for details of these visits. Applicants from other institutions interested in meeting with a representative of the school should write or call the Office of Enrollment Services. In addition, it is sometimes possible to arrange an interview with an alumnus, particularly where distance precludes travel to Durham. In all of these situations the emphasis is on exchanging information with the applicant.

For further information or to arrange a school visit, applicants may write to the Office of Enrollment Services or call (919) 613-8070.

Deferred Admission. Normally, applicants are admitted only to the class for which they have applied. However, a deferral of admission may be granted for the applicant to gain experience or to strengthen academic qualifications for graduate study or for other valid reasons. Except in unusual circumstances, a deferral of admission cannot be granted for more than one year. Deferrals are granted on individual bases. The size of each class frequently precludes open-ended guarantees of future admission; however, applicants with substantial reasons for deferring the start of graduate work are encouraged to send a request to the Office of Enrollment Services as soon as possible after receiving an offer of admission. Offers of financial assistance are cancelled upon deferral of admission and students must be reconsidered for financial aid.

Application Deadlines for the Professional Programs. Application forms and all other information required to complete the application and to allow a student to be considered for admission should be submitted to the Office of Enrollment Services by 15 February for the fall term and by 15 October for the spring term. All candidates for admission should make arrangements to complete the Graduate Record Examinations well in advance of these deadlines.

Offers of admission, including financial aid awards, are mailed to accepted students in early March. Decisions on applications received after the 15 February deadline are held until early April and are made on an individual basis according to the availability of student spaces and financial assistance.

Response to Offer of Admission. When admission is approved, the applicant will receive an offer of admission and an acceptance form. A nonrefundable tuition deposit is required with acceptance of the offer. The admission process is not complete until the acceptance form and the tuition deposit have been returned to the Office of Enrollment Services. Failure to respond by the stated deadline may result in cancellation of acceptance.

Admission to the Graduate School

Applications for admission to M.S., A.M., and Ph.D. degree programs should be obtained from and returned to the Dean of the Graduate School, Duke University, Box 90065, Durham, N. C. 27708-0065. Applicants to these programs must follow the procedures and meet the deadlines specified by the Graduate School. Initial inquiries and questions concerning fields of study are best directed to the Director of Graduate Studies, School of the Environment. In addition, prospective students are urged to write directly to professors whose research interests match their own to discuss opportunities.

Admission with Nondegree Status

Persons wishing to enter the School of the Environment as nondegree students must submit a special application form requesting nondegree status along with an application fee of \$25. The applicant must have completed a bachelor's degree from an accredited college or university and must submit an official transcript of all previous course work. The Graduate Record Examination is not required although the GRE score is helpful in the admissions process. The student must have one letter of recommendation; this letter should indicate why the applicant should be allowed to undertake nondegree study at Duke. The application itself requires a brief statement of purpose in which the applicant should state his or her reasons for such study at Duke.

Financial Information



Tuition and Fees*

Estimated Expenses for the Academic Year. The following approximate costs, applicable in 1994-95, are indicative of costs that can be expected by M.E.M. and M.F. candidates; A.M., M.S., and Ph.D. students should consult the bulletin of the Graduate School.

Tuition (\$7,100 per semester)	\$14,200
Student health fee (\$185 per semester)	\$370
Student government fee	\$10
Housing	\$3,225
Food	\$3,000
Books and supplies	\$850
Motor vehicle registration	
automobile	\$60-150
motorcycle	\$35

In addition to these necessary expenses, the student will incur others which will depend to a large extent upon individual tastes and habits. The average Duke student, however, can plan on a budget in the range of \$20,000 to \$24,500 for the academic year. Students with families naturally will have higher expenses.

Flat-fee Tuition. The flat-fee tuition allows Master of Environmental Management and Master of Forestry degree candidates to register for 9 or more units of credit for a fixed tuition payment per semester. The normal full-time enrollment is expected to be 12 units per semester, although units may vary from 9 to 15 depending upon the student's academic and assistantship requirements. Permission is required to register for fewer than 9 or more than 15 units in a semester.

*The figures contained in this section are projections and are subject to change.

Students in the two-year M.E.M. and M.F. programs will pay the flat-fee tuition for four semesters. Students in one of the concurrent degree programs will pay the flat fee for those semesters in which they are registered as full-time students in the School of the Environment. Students in the concurrent M.E.M./M.F. program pay the flat-fee tuition for a minimum of five semesters. Students in the one-year M.F. degree option will pay the flat fee for two semesters.

If the student is permitted to be enrolled part time (fewer than 9 units), he or she will be charged per unit of credit (\$625 per unit for the 1994-95 academic year).

Students who wish to earn additional credits during the summer will be charged at the part-time rate per units of credit. Students who have completed the required semesters in residence and all course requirements except the master's project will be charged a minimum registration fee (\$300 for 1994-95) each semester until the degree is completed.

All students are expected to be registered in residence, to be approved for a leave of absence, or to pay a minimum registration fee for each semester until their degree is completed.

Payment of Accounts. Invoices for tuition, fees, and other charges are sent by the Office of the Bursar and are payable by the invoice due date. No deferred payment plans are available. As a part of the agreement of admission to Duke University, a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied.

Late Payment Charge. If the *total amount due* on the student invoice is not received by the invoice due date, a penalty charge will be accrued from the billing date. The penalty charge will be at a rate of 1.25 percent per month (15 percent per annum) applied to the *past due balance*. The *past due balance* is defined as the previous balance less any payments and credits received during the current month. Student loan payments, if delayed for reasons beyond the individual's control, are treated as a credit on the student's invoice until the loan payment is received.

Restrictions. An individual will be in default of this agreement if the *total amount due* is not paid by the due date. An individual who is in default will not be allowed to register for classes, receive a copy of the academic transcript, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from the university.

Tuition Refund Policy. In case of withdrawal from the university, Title IV federal financial aid received by students enrolled for the first time will be refunded on a pro rata basis. The pro rata formula is defined as the total school charges times the remaining portion of the enrollment period for which the student has been charged, rounded downward to the nearest 10 percent, less any unpaid charges owed by the student. The pro rata refund policy does not apply to any student whose withdrawal is after the 60 percent point in the period of enrollment.

If the student receives federal financial aid but is not attending the university for the first time or if the student does not receive federal financial aid, he or she may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

Withdrawal	Refund
Before classes begin	full amount
During first or second week	80 percent
During third, fourth or fifth week	60 percent
During sixth week	20 percent
After sixth week	none

This schedule also applies to housing charges of students moving from university housing to off-campus housing. The student health fee will not be refunded except when withdrawal occurs before classes begin. In the event of death, a full refund of tuition and fees will be granted.

Late Registration. Students who register at a date later than that prescribed by the university must pay a fee of \$25 at the bursar's office.

Audit Fee. Students registered for a full course load may audit courses without charge. Otherwise, audit fees are \$625 per course.

Transcripts. Transcripts are available on request from the Duke University Office of the Registrar. During their first semester in residence, students are charged a \$30 fee that covers the request of transcripts. Transcripts cannot be issued by the School of the Environment.

Housing Charges. On-campus housing for professional and graduate students is available on a limited basis. Questions regarding costs should be addressed to the Office of Housing Administration, Duke University, Box 90451, Durham, N.C. 27708-0451.

Motor Vehicles. Motor vehicles parked on campus must be registered with the parking services office. Registration must be completed within five days after operation on campus begins. The proper registration decal should be displayed on the vehicle. The automobile registration fee is \$60 in ungated lots and \$150 in gated lots. Motorcycle registration is \$35.

Student Health Fee. All students are assessed a fee for the Student Health Service. For the fall and spring, the fee is \$370 (\$185 per semester). For the summer, the fee is \$55 per term.

Medical Insurance. All resident students are automatically billed for health insurance at the rate of \$618 per year (single student cost). Family plans are more and are available through the university bursar's office. A student who is covered under a family, group or individual major medical policy must sign a waiver form indicating that he/she does not wish to be covered by the university student insurance policy. All foreign students are required to register for student insurance (and for the family plan if they have a spouse or children living in Durham) unless they have valid documentation indicating major medical coverage acceptable in the United States.

Tuition and Fees for the Summer. For M.E.M. and M.F. students who wish to take additional credits during the summer, registration is charged per unit of credit (\$625 per unit in summer 1995). The summer student health fee and audit fee are listed above. Information on fees, housing, policies and procedures related to the Duke University summer session is available from the Office of Summer Programs, The Bishop's House.

Athletic Events. Students are admitted free of charge to all regularly scheduled university athletic events held on campus during the academic year, with the exception of basketball. Students who wish to attend home basketball games must enter the student ticket lottery and pay for tickets if selected.

Financial Assistance

Financial assistance in the form of scholarships, fellowships, or assistantships is available for qualified students pursuing either the professional degrees (M.E.M. or M.F.) or the graduate degrees (A.M., M.S., or Ph.D.). Students enrolled through the Senior Professional Program are not eligible for school supported financial assistance but may be eligible for federally funded student loans.

All professional degree students must file the Free Application for Federal Student Aid (FAFSA) to be considered for any type of financial aid. Applicants may obtain a

FAFSA form from a college or university counseling and placement center or financial aid office. Professional degree applicants must also complete the financial aid form included in the admissions materials. Scholarships are granted from university funds which are in limited supply. Consequently, only well-qualified students can expect to receive awards. Scholarships are awarded on the basis of demonstrated outstanding academic ability and a high degree of professional promise.

Fellowships are obtained from foundation grants, private industry, or individual donors. Donors of fellowship funds sometimes place restrictions on the use of the funds as well as on the amount of awards. Fellowships are awarded primarily to second- and third-year students on the basis of professional promise.

Research assistantships are obtained primarily from grant and contract funds awarded to various faculty in the school. University-funded assistantships are available for students who have sufficient experience to contribute to one or more ongoing research or academic programs.

Pursuant to the Tax Reform Act of 1986, students performing any services (whether degree related or not) required by their scholarship, fellowship or assistantship must have income taxes withheld. However, if the student anticipates no tax liability at the end of the calendar year, he or she can note "exempt" on the state and federal withholding forms and no taxes will be withheld. Income tax information is reported to the student by the university in January.

In all instances, admission to the school is a prerequisite for the award of assistance in any form. Professional students normally are offered financial assistance for two years of study; it is expected that they will complete their degree within this period of time. For graduate students, it is the policy of the school to provide financial assistance through university funds for three years; it is expected that A.M., M.S., and Ph.D. candidates will obtain research grants to fund their study past the third year. However, the school has the right to examine the progress of each student to determine eligibility for continuation of awards beyond the first year.

No student will receive financial aid while on probation. All returning professional degree students must complete the FAFSA form for each year of residence.

Eligibility for Financial Assistance

A significant portion of the financial assistance for students in the School of the Environment is provided by federal, Title IV funds. To qualify for such funding, usually in the form of loans, students must meet federal eligibility requirements including the maintenance of satisfactory academic progress. Professional degree students must complete at least 18 units of course work with at least 6 units of *G* and /or *E* grades during the first full year of study and may not receive a grade of *F* in any course to be eligible for federal financial aid for their second year.

Although professional degree students have five years from the first date of matriculation in the school to complete their degree requirements, they are eligible for federal financial assistance for the equivalent of four full-time semesters only. Students who fail to meet the satisfactory academic progress requirements or need federal financial assistance for more than the equivalent of four semesters may appeal to the admissions and awards committee.

Graduate degree (A.M./M.S./Ph.D.) candidates should review the Graduate School bulletin for details regarding satisfactory progress for their degree program.

SCHOLARSHIPS

University Scholarships. A limited number of scholarships are awarded each year to selected students who are pursuing either professional or graduate degrees. Awards are made on the basis of academic qualifications and professional or scientific promise. Amounts range from \$1,000 to \$6,000 for the academic year.

FELLOWSHIPS

Rachel Carson Graduate Fellowship. A fellowship is awarded to a selected student who is conducting research related to some aspect of the Rachel Carson Estuarine Research Reserve.

Federal Paper Board Company Fellowship. A fellowship is awarded each year to a selected student interested in a career in industrial forestry. The stipend ranges up to \$5,000 per year.

Virilis L. Fischer Fellowship. A fellowship is awarded each year to a second-year Master of Environmental Management or Master of Forestry candidate with demonstrated financial need. The stipend is determined by the amount of endowment income each year.

Leroy B. George Fellowship. A fellowship is awarded to a selected student from the Haywood or Buncombe counties or the Hendersonville, North Carolina, school systems. Second preference is given to a student from the southern Appalachian region. If a qualified student cannot be identified within the region the fellowship may be awarded to a student in the school who has a demonstrated interest in resource and environmental education and planning. The amount of the fellowship is set at \$1,000 per year.

Richard E. Hug Fellowship. A fellowship is awarded to a selected student who is pursuing a Master of Environmental Management or Master of Forestry degree. The stipend ranges up to \$2,000 per year.

Integrated Case Studies Fellowship. Fellowships are awarded to selected students who present appropriate case study proposals in applied ecology. Stipends range up to \$3,000 per year.

Mary Derrickson McCurdy Graduate Fellowship. A fellowship is awarded to a selected student who is conducting research at the School of the Environment Marine Laboratory.

Andrew W. Mellon Foundation Fellowship. Fellowships are awarded each year to selected students pursuing master's or Ph.D. degrees. Stipends range from \$1,000 to \$5,000 a year.

Muchnic Foundation Endowment Fellowship. A fellowship is awarded each year to a selected Master of Environmental Management or Master of Forestry candidate who has demonstrated financial need.

Robert Safrit Graduate Fellowship. A fellowship is awarded to a selected student who is conducting research in some aspect of marine science at the School of the Environment Marine Laboratory.

School of the Environment Alumni Association Fellowship. Fellowships are awarded each year to selected students who are pursuing a Master of Environmental Management or Master of Forestry degree. The students must have completed one year of study. The amount of the fellowships is set at \$2,000 per year.

School of the Environment Alumni Association Minority Fellowship. A fellowship is awarded to a selected minority applicant for the Master of Environmental Management or Master of Forestry degree. The amount of the award is determined by the endowment income each year.

Harvey W. Smith Graduate Fellowship in Biological Oceanography. A fellowship is awarded to a selected student who is conducting research in biological oceanography at the School of the Environment Marine Laboratory.

Frederick K. Weyerhaeuser Forest History Fellowship. This fellowship is available campus-wide to graduate students who wish to study broadly in the area of forest and conservation history. The annual stipend is \$10,000. Inquiries should be made to the Forest History Society, 701 Vickers Avenue, Durham, N. C. 27701.

Sara and Lewis Zirkle Fellowship. Fellowships are awarded to selected students pursuing master's or Ph.D. degrees. The stipend is determined by the amount of the endowment income each year.

ASSISTANTSHIPS

Assistantships for the Master's Candidate. Assistantships are awarded to graduate and professional students during their first year of study to assist faculty and staff with teaching, research, professional and other projects. It is expected that students will work for 10 hours a week on their assigned project; however, under special circumstances, students may be requested for as much as 20 hours of assistance per week. *Assistantships require a regular schedule for work to be arranged between the student and the faculty or staff member to whom he or she is assigned.*

During the second year of study, professional students may fulfill the assistantship requirement by working with a faculty or staff member on a specific assignment, working on a continuation of a summer internship project, or working independently on their master's project, subject to their adviser's approval.

The hours of assistance may limit the number of credit hours for which a student may register. Normally, professional students who receive assistantships for 10 hours per week are limited to 12 units of credit per semester. Those who give 20 hours of assistance per week are limited to 9 units of credit. Exceptions require the permission of the student's adviser and the dean.

Most assistantships are paid by the school on the monthly payroll. For the 1994-95 academic year, the award for 10 hours of assistance was \$2,800.

Normally, assistantships are available only for the academic year and require full-time enrollment in the school. A few awards may be available during the summer, however, for faculty research, staff, and Duke Forest assistance. Summer stipends are paid on a biweekly or monthly basis.

Assistantships for the Ph.D. Candidate. A selected number of Ph.D. candidates each year may be offered a financial aid package consisting of full tuition plus a monthly stipend. The tuition is a scholarship from school funds and is tax exempt. The monthly stipend (\$1,038 per month in 1994-95) requires 10 to 12 hours of work per week during the academic year and is taxable. These graduate assistants may be retained by the faculty through research funding for the remaining three months of the summer.

Typically, the Ph.D. candidate is assigned to a member of the faculty to work on a particular research project under his or her direction and/or to provide teaching assistance. Furthermore, the research undertaken is normally a part of the student's graduate program and serves as a basis for the doctoral dissertation. With few exceptions, assistantships are available only for the first three years of graduate study.

Graduate assistants are required to maintain a regular schedule of work as determined by the faculty member to whom each is assigned.

Research Assistantships. Funded from grant and contract research under the direction of various members of the faculty, research assistantships provide support during the latter stages of study of the Ph.D. candidate. Typically, the research assistant completes one or more phases of a research project under the direction of the principal investigator, a member of the faculty. Normally, the research completed forms a substantial component of the requirements of the Ph.D. dissertation. However, in some instances this may not be the case and the students pursue dissertation research in a related area of study.

The stipend and level of service required of research assistants depend primarily on the nature of a particular research project and the availability of funds. Normally, research assistants are committed to 720 hours of service during the academic year (20 hours per week). Some research assistantships require full-time service during the summer. A regular schedule of research under the direction of the principal investigator must be maintained.

Work-Study. Work-study funds are administered for student employment through the Office of Enrollment Services. Students in the school are not eligible for work-study jobs administered through the university's placement office and are not awarded work-study funds in financial aid packages. At the beginning of the academic year, students are made aware of work-study opportunities and informed of the application procedures. Since many of the positions are funded through the federal work-study program, interested students should file the Free Application for Federal Student Aid (FAFSA).

Application for Awards for the Entering Student

Application for awards is made concurrently with the application for admission. Applicants should initiate the necessary action early to ensure that the required documents are filed with the school's Office of Enrollment Services on or before 15 February prior to enrollment.

Notification and Acceptance of Awards. Recipients of awards are notified in early March. Completed applications received after the 15 February priority deadline will be considered if vacancies occur at a later date.

Scholarships, fellowships, and the various categories of assistantships provide the basis for professional/graduate student support. Once offered by the university or the school, funds are committed to one student and are therefore unavailable to others. *As a consequence, it is the policy of the school that all awards offered can be declined prior to 1 May without prejudice. However, offers accepted and left in effect after 1 May are binding for both the student and the school.*

Loans

In terms of a needy student being able to afford the graduate program of his or her choice, federally insured student loans are often necessary and useful. Students should consider the nature of the loan and the positive and negative aspects of future loan payments, as well as investigate all other forms of financial assistance.

Federal law requires all students to have completed a Free Application for Federal Student Aid (FAFSA) to determine financial need. The FAFSA form may be obtained from a college or university counseling and placement center or financial aid office. No loan application will be processed without the FAFSA form having been submitted to the central processor.

In addition, federal law requires submission of financial aid transcripts from colleges previously attended, a statement of educational purpose, and a statement of compliance with Selective Service registration. In some cases, verification of income and other information are required.

Federal Stafford Loans. Federal Stafford Loans of up to \$18,500 (\$8,500 subsidized and \$10,000 unsubsidized) are available for eligible graduate/professional students. For loans made to new borrowers, interest is calculated at a variable rate, not to exceed 8.25 percent. Students who have outstanding loans retain their current interest rate. If a student is eligible for a subsidized Federal Stafford Loan, the interest is paid by the federal government while the student is enrolled in school. Interest on unsubsidized loans must be paid by the student during enrollment or capitalized to the principal at the borrower's request.

Students may be eligible for a combination of subsidized and unsubsidized loans. Eligibility for the subsidized loan is determined by subtracting all financial aid awards and the student's expected contribution from the School of the Environment's student budget. The student's contribution is computed from the income and asset information submitted on the FAFSA. Eligibility for the unsubsidized loan takes into consideration the other financial aid being received by the student, but the expected student contribution is not considered. Students may borrow from the unsubsidized loan program the difference between the student budget and their other aid (including any subsidized Stafford Loan), up to a maximum of \$10,000 for an academic year.

To obtain a Federal Stafford Loan, students may apply to either a state agency or a bank that participates in the program. A partial listing of lenders is available from the school's enrollment services office.

Students who borrow through the Federal Stafford program will be given entrance and exit interviews concerning the projected and actual costs of their loans. They will also be provided with information on loan consolidation, should this be desired or needed.

Federal Carl Perkins Loans. Loans through the Federal Carl Perkins program are administered through the university for students who qualify under the federal guidelines. The student must qualify as needy by the FAFSA form and in need of additional assistance beyond the maximum Federal Stafford allocation. The interest rate is 5 percent, with payment on interest and principal deferred until six months following graduation.

GradSHARE Loans. Duke University participates in a private student loan program called GradSHARE which enables students to borrow up to \$15,000 per year to meet educational expenses. Repayment of the principal and interest may be deferred. Two interest rate options are available: a monthly variable rate that does not exceed the prime rate, or a one-year renewable rate that is set annually and will not exceed the prime rate.

Unlike the federally subsidized loans, GradSHARE loans are available to students who do not qualify under federal guidelines, such as students whose personal income for the previous year was too high to qualify for a federal loan. Under GradSHARE a graduate or professional student may be able to borrow up to \$7,500 per year without a cosigner.

Interested students should write directly to the school for further information.

Federal Grant Programs. Students with only three years of study at one of the institutions in the Cooperative College Program may be eligible for undergraduate state and federal grant programs. Such students should consult their undergraduate financial aid officers, state loan agencies, or federal granting agencies for applications, requirements, and restrictions.



Marine Laboratory



The Marine Laboratory is a campus of Duke University and a unit within the School of the Environment. Its mission is education and research in the basic ocean sciences, marine biomedicine, marine biotechnology, and coastal resource management. The laboratory is situated on fifteen acres of Pivers Island, within the Outer Banks of North Carolina, and within walking distance of historic Beaufort, one of North Carolina's oldest towns. Beaufort is approximately 180 miles from Duke's Durham campus.

The area's system of barrier islands, sounds, and estuaries is well known for its rich flora and fauna and diverse habitats. Readily accessible from the Marine Laboratory are the Atlantic Ocean, Cape Lookout National Seashore Park, the Rachel Carson Estuarine Research Reserve, estuaries, barrier islands, wetlands and maritime forests. The area lies within the range of both temperate and tropical species of biota, making it an ideal and unique setting for study and research. The edge of the Gulf Stream oscillates between thirty and forty miles offshore, with numerous reefs on the continental shelf.

An internationally renowned research and training facility, the Marine Laboratory had its beginnings in the 1930s when Dr. A. S. Pearse and colleagues from Duke University were attracted to Pivers Island for their summer field studies. The site afforded an excellent location for a marine facility, and through efforts of Dr. Pearse and others, the land was acquired for the Duke University Marine Laboratory. Construction began and by 1938 the first buildings were erected. Originally, the facility served only for summer training and research.

The Marine Laboratory has experienced considerable growth since the 1930s and today operates year-round to provide training and research opportunities to about 3,500 persons annually, including undergraduate and graduate students enrolled in the laboratory's academic programs, visiting student groups who use the laboratory's facilities, and scientists who come from North America and abroad to conduct their own research.

Historically, the Marine Laboratory has operated within the university as an inter-departmental training and research facility. In 1991 it was included in Duke's School of the Environment. Resident faculty represent the fields of marine biology, marine geology, oceanography, marine biomedicine, and marine biotechnology. The faculty serve both undergraduate and graduate academic programs and conduct a wide range of both basic and applied research.

The physical plant consists of twenty-three buildings, including four dormitories, a large dining hall, one residence, a boathouse, a storehouse for ship's gear, classroom laboratories, six research buildings, and a maintenance complex.



Research and teaching facilities also include the I. E. Gray Library-Auditorium which houses the Pearse Memorial Library, a specialized collection of 53,000 catalogued reference books and journals and 23,000 reprints. The laboratory has extensive computing facilities for use by staff, students and visiting investigators. The Marine Laboratory is also home port for the R/V *Cape Hatteras*, a 135-foot research vessel operated for the National Science Foundation by the Duke/University of North Carolina Oceanographic Consortium. To remain at the forefront of ocean science education, the Marine Laboratory in 1991 launched the R/V *Susan Hudson*, a 50-foot, state-of-the-art coastal research and training vessel.

The Beaufort area provides location for five other facilities which collectively are one of the higher concentrations of marine scientists in the nation. These are the University of North Carolina, Institute of Marine Sciences; North Carolina State University, Seafood Laboratory; State of North Carolina, Aquarium at Bogue Banks; State of North Carolina, Division of Marine Fisheries; and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Beaufort Laboratory. This concentration of marine scientists provides a critical mass for the pursuit of science and education.

The resident faculty offer a wide variety of graduate courses in the marine sciences that are appropriate for students planning careers in basic or applied research and/or teaching, environmental management or policy sciences, or environmental health sciences. Courses are offered during both the academic year and the summer. Many of the courses are cross-listed with the Graduate School Departments of Botany, Cell Biology, the Environment, Geology, Public Policy Studies and Zoology. Graduate research or individual study courses are also offered. Most of the summer courses carry 4 or 6 units of credit and include laboratory and direct field or shipboard experience.

Students have access to all laboratory facilities and the opportunity to meet visiting scientists from around the world. A seminar speaker series is also offered. Room and board are available, and summer tuition scholarships are offered on a competitive basis.

Further information and application materials may be obtained from the Director of Admissions, Duke University School of the Environment Marine Laboratory, 135 Duke Marine Lab Road, Beaufort, N.C. 28516-9721; telephone (919) 728-2111.

*Center for Resource and Environmental
Policy Research*



Director

Robert G. Healy, *Professor*

Faculty

Robert Conrad, *Associate Professor, Public Policy Studies*
Frederick W. Cabbage, *Adjunct Professor*
James T. Hamilton, *Assistant Professor, Public Policy Studies*
Milton S. Heath, *Adjunct Professor*
Thomas Holmes, *Adjunct Assistant Professor*
Randall A. Kramer, *Associate Professor*
Wesley A. Magat, *Professor, Fuqua School of Business*
Carol A. Mansfield, *Assistant Professor*
Marie Lynn Miranda, *Assistant Professor, Public Policy Studies*
Michael K. Orbach, *Professor of the Practice of Marine Affairs and Policy*
Orrin H. Pilkey, *James B. Duke Professor*
Narendra P. Sharma, *Adjunct Professor*
Harold K. Steen, *Adjunct Professor*
David N. Wear, *Adjunct Assistant Professor*

The Center. The Center for Resource and Environmental Policy Research is committed to objective and timely analyses of critical natural resource and environmental issues, both national and international.

During the past few years, a substantial and comprehensive body of legislation has been enacted to address resource and environmental problems, much of it strongly influenced by information provided by special interest groups. Often, this legislation has been drafted and passed in a quasi-crisis atmosphere with a consequent absence of mature deliberation. The center was developed in response to recognition of the many conflicts developing over competitive use of natural resources and consequent legislative regulation.

Because contemporary resource-environmental problems are deeply embedded in the social, economic, and political fabric of the country, they are in need of careful and deliberate study. It is in the national interest that such issues be examined in a setting conducive to independent thought with appropriate regard for timeliness of results and conclusions. The Center for Resource and Environmental Policy Research at Duke University is designed specifically to provide the proper setting for such an approach.



Among the current research topics are:

- Land use planning and rural development
- Soil and water resources policy
- Forest economics and policy
- Environmental risk analysis
- International resource and environmental policies
- Coastal zone management
- Tourism and the environment
- Economic valuation of the environment
- Sustainable Third World development
- Industrial waste management

The Center Organization. The center is by design and intent a flexible, multidisciplinary unit. Headed by a director and staffed by an interdisciplinary faculty, the center offers opportunities for involvement to executives, administrators, political representatives, mid-career professionals and academicians. A major aim is to bring together special groups of scholars and professionals to focus their attention on contemporary resource and environmental research problems. Degree candidates in the School of the Environment or the Graduate School participate in center research through collaboration with affiliated faculty.

The center is viewed as an all-campus unit at Duke University, drawing primary support from the School of the Environment while maintaining strong associations with the Schools of Law, Business, and Engineering, and the Terry Sanford Institute of Public Policy.

Beyond the Duke campus, the center maintains close ties with officials from government and industry and the faculty and students of other universities, particularly the University of North Carolina and North Carolina State University.

Several members of the center's faculty are allied with the Southeastern Center for Forest Economics Research. This consortium, headquartered at the Research Triangle Park, is sponsored by the United States Forest Service and several regional universities.

Wetland Center



Director

Curtis J. Richardson, *Professor*

Faculty

Norman L. Christensen, Jr., *Professor*
Christopher B. Craft, *Assistant Research Professor*
Richard T. Di Giulio, *Associate Professor*
Bruce C. Faust, *Assistant Professor*
Gabriel Katul, *Assistant Professor*
William W. Kirby-Smith, *Associate Professor of the Practice of Marine Ecology*
Randall A. Kramer, *Associate Professor*
Daniel A. Livingstone, *James B. Duke Professor, Zoology*
Ram Oren, *Associate Professor*
Orrin H. Pilkey, *James B. Duke Professor*
Robert G. Qualls, *Assistant Research Professor*
Joseph S. Ramus, *Professor*
Kenneth H. Reckhow, *Associate Professor*
Daniel D. Richter, *Associate Professor*
William H. Schlesinger, *Professor, Botany*
Panchabi Vaithyanathan, *Assistant Research Professor*

Research Associates

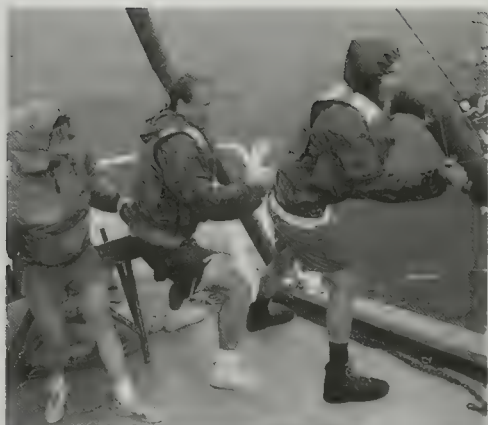
Lisa Blumenthal, M.E.M., *Associate in Research*
Donna R. Heath, M.S., *Data Manager*
Paul Heine, B.S., *Laboratory Administrator*
Robert R. Johnson, B.S., *Florida Wetland Center Manager*

Technical Staff

Julie Rice, B.S., *Associate in Research*
Wes Willis, B.A., *Associate in Research*
John Zahina, *Associate in Research*

The Center. The Duke University Wetland Center conducts, sponsors, and coordinates research on critical wetlands issues. Wetlands are ecosystems in which water level and low oxygen conditions largely determine the development of plant and animal communities. They are transitional lands between terrestrial and aquatic ecosystems. Some examples are marshes, swamps, bogs, fens, and peatlands. Wetlands usually support a prevalence of specialized animal species and plants adapted for life in saturated, anaerobic soils.

Society is now recognizing that wetlands often provide valuable ecological services on the landscape. Specific wetland types can provide flood control, influence ground-



water recharge, function as natural filters for sediment, and serve as nutrient sinks. They also provide habitats for fish, shellfish, waterfowl and other wildlife; preserve rare and endangered species; and produce timber, just to name a few of their ecological benefits. Wetlands create recreational opportunities and add to the aesthetic quality of life. They are also of great scientific value. For example, wetlands export carbon and nutrient-rich particles which are a critical food source to coastal estuarine fisheries. They provide important data on global pollution and the greenhouse effect and have yielded life-saving drugs, such as streptomycin, an antibiotic derived from wetland soils.

Human activities have resulted in the loss of nearly 50 percent of the wetlands once found in the United States. More than 11 million acres of wetlands disappeared between the mid-1950s and the mid-1970s—a total area twice the size of New Jersey. Some coastal regions, various prairie pothole areas of the Midwest, and bottomland hardwood regions of Mississippi have experienced losses in excess of 90 percent. The challenge facing society is how to manage remaining wetland ecosystems, or construct new wetlands, to sustain functional ecological values and habitats while allowing compatible development on adjacent landscapes.

Research is needed to:

- Rank and evaluate wetlands in order to protect those that (1) are unique and fragile or (2) provide key ecological functions on the landscape
- Devise effective management guidelines for existing wetland habitats
- Develop best management practices for forestry and agriculture in or adjacent to wetlands
- Scientifically and legally delineate wetland boundaries for upland ecosystems
- Develop reclamation and construction procedures for wetlands
- Determine the effectiveness of different wetland types in processing and storing carbon and nutrients
- Evaluate wetlands in terms of both economic and ecological values

The Center Organization. Headed by a director and staffed by an interdisciplinary faculty, the center brings together scientists and professionals to focus attention on wetland issues of both regional and national scale. As part of a large private university, the center addresses multidisciplinary issues free of partisan influence.

The faculty members and research associates in the center have appointments in Duke's School of the Environment and the Departments of Botany, Zoology, and Geology. The Terry Sanford Institute of Public Policy and Schools of Law, Business, and Engineering are among other academic units providing interdisciplinary support.

The core researchers for the center are the director, faculty, and visiting scholars. Degree candidates in the School of the Environment or the Graduate School participate in Wetland Center research through collaboration with affiliated faculty. Research support is available for qualified students.

Marine Biomedical Center



Director

Celia Bonaventura, *Professor*

The National Institute of Environmental Health Sciences provides support to the Duke University Marine and Freshwater Biomedical Center with the objective of promoting research in the marine sciences relevant to problems of environmental health. The mission of the center is to make use of marine or freshwater organisms in research, teaching and training efforts in areas of human and environmental health significance and to develop nonmammalian models and innovative methods for toxicological research. The mechanisms underlying adverse environmental health effects are of primary concern and are addressed through three research themes: toxicology of metals and free radicals, developmental toxicology and carcinogenesis, and environmental toxicology and chemistry. Theme leaders assist the center directors in establishing a network of communication in the health-related aspects of research on aquatic organisms.

Studies at the center concern:

- aquatic models for biomedical research
- the effects of metal and nonmetal pollutants on marine and freshwater species
- mechanisms of carcinogenesis in marine and freshwater species
- pollutant toxicology using blood as a model organ
- behavioral and developmental effects of pollution of estuarine and marine systems

Feasibility studies are conducted to explore the advantages of various experimental approaches and to encourage innovative research.

Students interested in working with members of the center's participating faculty should direct their first inquiry to the Admissions Office, Duke University School of the Environment Marine Laboratory, 135 Duke Marine Lab Road, Beaufort, N.C. 27516-9721; telephone (919) 728-2111. It should be noted, however, that the center does not grant degrees. Graduate students are enrolled in the degree programs of the respective departments or schools of their mentors.

Center for Tropical Conservation



Director

John W. Terborgh, *Professor*

Faculty

William Ascher, *Professor, Public Policy Studies*

Norman L. Christensen, Jr., *Professor*

Robert Conrad, *Associate Professor, Public Policy Studies*

Kenneth Glander, *Professor, Biological Anthropology and Anatomy*

Robert G. Healy, *Professor*

Julie Johnson, *Assistant Research Professor*

Randall A. Kramer, *Associate Professor*

Marie Lynn Miranda, *Assistant Professor, Public Policy Studies*

Ram Oren, *Associate Professor*

Daniel D. Richter, *Associate Professor*

Carel van Schaik, *Associate Professor, Biological Anthropology and Anatomy*

Donald E. Stone, *Professor, Botany*

The Center. The Duke University Center for Tropical Conservation (CTC) grew out of a common concern on the part of faculty from many disciplines for a host of global problems that originate in the interaction of humans with the environment. The world faces a series of worsening crises, notably overpopulation, landlessness, pollution, deforestation, climate change, poverty, disease, and increasingly, famine. The goal of the Center for Tropical Conservation is to contribute to the alleviation of the world environmental crisis, particularly as it affects the developing countries of the tropics.

The CTC works toward this goal through a tripartite program of research, training and communication. CTC research is of an interdisciplinary nature, based on collaboration among natural and social scientists. The development of technologies for managing natural resources is coupled with economic analyses to suggest policy reforms that would promote the sustainable use of these natural resources. CTC research is being immediately incorporated into Duke University courses and seminars by participating researchers and faculty. Information is disseminated through academic and semipopu-

lar publications, courses, newsletters, workshops and conferences. Ultimately, the results of CTC research and training will be made available to governmental and nongovernmental organizations in both the United States and the developing world.

Current research focus areas are:

- Managing for biodiversity
- Natural forest management in the tropics
- Forestry institutions in the tropics
- Environmental policy in the context of political and economic change
- Ecotourism

The Center Organization. The CTC is a small organization that devotes its resources to strengthening the multidisciplinary linkages necessary to address issues of environmental policy relevant to the tropics. CTC research draws on the skills of Duke faculty from many departments, other universities in the Research Triangle, nonprofit and for-profit research organizations, and the federal government.

The center is headed by a director and an executive committee of Duke faculty. The CTC also consults national and international advisory boards of experts in such fields as ecology, environmental science, and economics.

The Center for Tropical Conservation is housed in the Simons Building, 3705-C Erwin Road; telephone (919) 490-9081. The mailing address is Duke University, Box 90381, Durham, N.C. 27708-0381.

Graduate Training. The CTC has developed the International Professional Training Program in response to the need for broadly educated environmental managers and policy makers in developing countries worldwide. The program recruits early- to mid-career professionals from developing countries who are already working in governmental and nongovernmental environmental institutions. Citizens of developing countries are selected for the program with particular attention to their potential to influence their nations' policies regarding tropical forest management, conservation, and natural resource use.

The CTC does not grant degrees or sponsor student research per se. Degree candidates in the School of the Environment or the Graduate School participate in CTC research through collaboration with the center's participating faculty.



Alternative Educational Opportunities



Duke/UNC Oceanographic Consortium

The Duke/University of North Carolina Oceanographic Consortium operates a 135-foot oceanographic research vessel, the R/V *Cape Hatteras*. The ship operates both on the continental shelf and in the deep sea in the western North Atlantic, concentrating in the region between Nova Scotia and the Caribbean. The ship is a member of the academic research fleet supported by the National Science Foundation for the purpose of providing oceanographic research opportunities to investigators. R/V *Cape Hatteras* is used for training at sea by the universities that make up the Oceanographic Consortium (Duke, North Carolina State, UNC-Chapel Hill, UNC-Wilmington, UNC-Greensboro, and East Carolina). The consortium also manages the acquisition and maintenance of oceanographic instrumentation used aboard the R/V *Cape Hatteras*, and holds annual meetings of ocean sciences staff and graduate students from member institutions. These meetings are held at the School of the Environment Marine Laboratory.

Center for Forest Resources

The mission of the Center for Forest Resources is to promote disciplinary and interdisciplinary research that increases the ability of humans both to use and to conserve forest ecosystems. Established in the School of the Environment in 1993, the center is intended to help organize a multidisciplinary research community to study the increasingly complex issues related to forests worldwide. Indirectly, the center also enhances the school's educational programs in forest ecology, silviculture, and related social sciences. As the center grows, its activities will include seminars and discussions during the academic year and the development of funding sources for research projects, student fellowships, and visiting professorships.

Research in the Center for Forest Resources is based firmly on the fact that increasing human demands and pressures have created ecological and social issues in the forest that are far more complex than the traditional forestry issues associated with fiber production. More specifically, research addresses how forest ecosystems grow and function, how long-term forest productivity can be sustained and enhanced, how forest biotic diversity can be conserved and managed, and how forests can better contribute to human welfare and environmental quality.

The School of the Environment is uniquely positioned to address this type of interdisciplinary forestry research through its affiliation with faculty across the Duke campus in botany, zoology, business, law, political science, history, and biological anthropology; with the Center for Tropical Conservation, Organization for Tropical Studies, and Forest History Society; and with off-campus researchers at the USDA Forest Service Forestry Sciences Laboratory, North Carolina State University, and the Univer-

sity of North Carolina at Chapel Hill. In addition, center researchers have access to the extensive research facilities of the Duke Forest and the Duke phytotron.

Until a director of the newly formed center is appointed, inquiries for further information may be directed to the office of the dean.

Forest History Society

Founded in 1946, the Forest History Society is a nonprofit, nonadvocacy organization committed to balanced and objective investigations of human interaction with the forest environment through time. Although its major focus is North America, the society is involved with a network of forest historians worldwide. In 1984, it became affiliated with Duke University and moved its headquarters to Durham.

The society emphasizes the utility of history to decision making in both the public and private sectors. The society believes that most currently held opinions are strongly influenced by perceptions of the past and that a clear understanding of what really happened, as today's issues evolved, is a vital component in the process of making prudent choices.

Five major emphases enable the society to achieve its goals: *Forest & Conservation History*, research and publication, archival collecting, library and reference, and service and professional outreach.

Forest & Conservation History is published quarterly. Its refereed articles, book reviews, bibliographic listings, and news enable investigators to keep current with the field. Research and publications, supported largely by grants, focus on topics that are important today and are also significant historically. Among the current topics are the history of forest resource technology, forest economics, sustained-yield forestry, forestry on Native American lands, wood as an energy source, forest taxation, labor relations in the forest industries, and industrial forestry research.

The collection of archival materials has been a major effort since the society was founded. Included in the archives are the records of the American Forest Institute, National Forest Products Association, and the Society of American Foresters. The society's library and reference staff provide convenient access to the extensive literature of the field. Students and faculty of the university are welcome to use these valuable resources. The service and outreach emphasis enables society staff to be active participants in their professions. Included are teaching and advising assignments at the School of the Environment.

Inquiries regarding the facilities and services offered by the society may be addressed to Harold K. Steen, Executive Director, Forest History Society, 701 Vickers Avenue, Durham, N.C. 27701; telephone (919) 682-9319.

Integrated Toxicology Program

The School of the Environment houses the ecotoxicology track of Duke University's graduate program in toxicology. The Integrated Toxicology Program operates under a specific charter to develop holistic and innovative approaches to toxicology training and to provide three training tracks: (1) general toxicology, with broad training in the principles and concepts of toxicology; (2) specialized toxicology, emphasizing such areas as pulmonary toxicology or biochemical toxicology; and (3) ecotoxicology.

The study of ecotoxicology focuses on the principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and effects of toxics on organisms and ecosystems. The curriculum is designed to teach the student the basic principles of biochemistry, physiology, toxicology, pathology, and ecology along with specific skills in ecosystem analysis, environmental health, epidemiology, statistics, and risk analysis so that he or she can design, execute, and interpret experiments in ecotoxicology.

Completion of this training program at the Ph.D. level provides career opportunities in academia, industry, and research laboratories. An ecotoxicology student is affiliated as a postdoctoral fellow or graduate student (Ph.D. or M.S.) in the School of the Environment. All students are required to complete the core sequence of the Integrated Toxicology Program and the ecotoxicology track requirements in addition to specific degree requirements.

Training in ecotoxicology is available to professional students in the School of the Environment through the Master of Environmental Management program in Environmental Toxicology, Chemistry, and Risk Assessment. M.E.M. students have access to courses in the Integrated Toxicology Program curriculum and receive training appropriate for careers in industry, consulting firms, and government agencies concerned with management of hazardous substances.

Students seeking admission to the program as a Ph.D. candidate make initial application to the Graduate School for admission to the Department of the Environment. Fellowships are available to outstanding students.

Integrated Case Studies

The case study approach to graduate education affords the student an opportunity to develop analytical and management skills through a close look at problems in resource and environmental management and policy. Case studies are used in class instruction in both traditional and intensive courses in several of the school's study areas.

In addition to utilizing completed case studies as course materials, students also have the opportunity to participate in the research and preparation of new case studies. The process of case preparation brings one in contact with professionals, businessmen, and others and offers a bridge between the academic curriculum and practical experience. This experience and the contacts made in the process of case research are valuable assets in securing employment.

The case studies are termed "integrated" case studies in natural resource analysis because they result from the cooperative efforts of a team of investigators comprising resource-ecologists, -economists, and -planners, as well as political scientists, sociologists, and others. The team approach is used in recognition of the fact that the successful analysis and resolution of the nation's complex resource and environmental problems requires a holistic perspective. Optimally, this results in an exploration of the full ramifications of utilizing natural resource systems.

Case study formats have varied. For example, projects have resulted in color and sound 16mm films, simulation games and workshop/conferences, as well as written reports. Typical issues addressed by past case studies include highway siting, hazardous waste disposal, back country management, use of herbicides in forest management, and the development and management of wetlands.

Financial assistance, in the form of research fellowships, is available to qualified students interested in case study analysis. Up to 6 units of academic credit may be earned for case study work. Proposals for case studies are developed in consultation with the student's faculty adviser and the case studies director, Curtis J. Richardson.

Intensive Courses

Intended for both practicing professionals and advanced full-time students who are pursuing careers in resource management, policy, and environmental science, the intensive courses offer an alternative to traditional full-semester courses. The sessions are designed to allow regular students to blend theory with practical experience as well as to allow experienced professionals to update theory and methodology. Recognized subject matter specialists provide instructional resources not normally available to the

university community. The result is an enriched educational experience through the exchange of ideas and information by participants of diverse backgrounds.

The intensive courses are organized into week-long modules. A course consists of one or two modules, each a discrete unit of study which may be taken alone for credit. In two-part courses, however, the first week may be a prerequisite to the second.

Based on available space, School of the Environment students (M.F. and M.E.M. degree candidates) may register for the intensive courses two weeks prior to the first day of the course; students in their second year of study are given priority. One unit of credit may be earned for each week of an intensive course. Students may not register for more than two intensive courses in a semester without special permission from their adviser and the intensive course coordinator.

Courses in the intensive course series are listed in a special section in the chapter "Courses of Instruction" in this bulletin. They also are described as part of the Senior Professional Program. A brochure containing complete information on the intensive courses to be offered during a semester may be obtained from the school office.

Interaction with Professionals

Using discretionary funding from a variety of sources, the School of the Environment sponsors a Distinguished Visitor Series to bring outstanding guests to visit the school on Fridays during the spring semester. The major focus of the visitor's day on campus is a seminar on current environmental and natural resource management concepts, practices, and policy. Topics and speakers are selected in accordance with interests of faculty and students to reflect national and international issues. Speakers are drawn from the senior administrative ranks of public agencies, industries, nonprofit organizations, and the consulting field. Each presentation is accompanied by an informal luncheon or small group meetings with students and faculty, which permit continued discussion. Students may take the Distinguished Visitor Series for 1 unit of seminar credit.

In addition to the Distinguished Visitor Series, the grants help to support other courses and activities that meet the objective of the exchange of ideas between practicing natural resource professionals and university students and faculty. These activities include an environmental seminar series, a forest utilization field trip to industry facilities in the South, and a western field trip. Funding is available on a competitive basis for individual students who wish to attend or present papers at conferences and scientific meetings.

Internships

An internship with a public agency, corporation, consulting firm, or conservation organization is a valuable part of graduate professional education. The School of the Environment Office of Placement and Internship works with natural resource professionals to develop paid intern opportunities for professional and graduate degree candidates. Most students pursue internships during the summer between their first and second years of study, although internships may be taken at other times and for a longer duration.

Academic credit can be earned for an internship; however, in order to receive credit, a plan of study must be prepared in advance and approved by the student's faculty adviser and the dean. The internship must contribute substantially to the educational objectives of the student. Many students use the intern experience as a basis for the master's project. Further information may be obtained from the school office.

International Studies

The School of the Environment has a history of contribution to international education and research. Graduates of the school, many of them foreign nationals, hold

significant positions in many countries in multinational corporations, United States government agencies, or resource and conservation organizations that have global responsibilities. Members of the faculty have served overseas in programs of teaching and research, in both the developed and developing parts of the world.

The contemporary need for greater attention to international studies has led the school to develop professional associations and curriculum options for students who wish to combine international interests with study of natural resources and the environment. Duke University is a member of the South Atlantic States Association for Asian and African Studies and the Organization for Tropical Studies. Duke researchers and teachers collaborate with colleagues at the University of North Carolina at Chapel Hill and North Carolina State University through the Center for World Environment and Sustainable Development. On campus, an active Center for International Studies, Center for Tropical Conservation, and Center for International Development Research provide a rich array of educational and research opportunities with global emphasis. Within the School of the Environment there is an active student international environmental study group. The potential exists for student participation in international projects through competition for grants and fellowships. In addition, students in the school may elect area studies or languages to further their understanding of global issues and cultures.

The school welcomes foreign students and considers an international student body of value to the learning environment. Qualified foreign students in Trinity College and in graduate and professional schools of the university are admitted to courses in the school, subject to the approval of the student's adviser and the course instructor.

Cooperative Colleges

The Cooperative College Program is designed to coordinate the education of students in selected undergraduate schools with graduate programs in the broad area of resources and environment offered at Duke. Students are accepted for either of two degrees, the Master of Forestry (M.F.) or Master of Environmental Management (M.E.M.). Although the program is designed to accommodate a wide range of undergraduate backgrounds, experience of several years indicates that it is best suited to majors in one of the natural or social sciences, pre-engineering, business, natural resources, or environmental science.

The program accepts students after three years of undergraduate study. With appropriate guidance, highly qualified students can reach a satisfactory level of preparation for graduate work at Duke in three years of coordinated undergraduate study. The baccalaureate degree is awarded by the undergraduate school after the student has earned enough units at Duke to satisfy the requirements of the undergraduate institution. Minimum time required to complete the bachelor's degree is two full-time semesters at Duke. After four semesters at Duke, in which a minimum of 48 units of credit is earned, students may qualify for one of the professional master's degrees.

A student interested in entering the Cooperative College Program should apply to one of the participating schools, a list of which is available from the School of the Environment enrollment services office. Each can provide information on courses of study and bachelor's degree requirements. Students applying for admission to Duke after the third year of study should do so by 15 February of the third year. Applicants from the participating schools are considered regular applicants for admission and are judged by the same criteria; therefore, students should submit application forms, transcripts, letters of recommendation, and results of the Graduate Record Examination. If the student is applying for a 3-2 program, he or she must also submit a letter from the undergraduate dean approving the application.

Senior Professional Program



Keeping up with new knowledge presents a challenge to all professionals. For the natural resource based industries and agencies, the problems of technical change are compounded by rapidly changing social, political, and economic values. The forest resource, for example, must be managed to produce a reasonable return on investments as well as to provide a reliable source of future raw materials. The forester of today must be well-versed in the techniques of forest management and those of resource analysis to ensure financial solvency in times of increasing economic stress. An understanding of the management sciences and the concepts of operations research is also vital. Few natural resource professionals have this background, however, and few are able to combine formal, continuous educational programs with the day-to-day pressures of a career.

The School of the Environment recognizes the need for contemporary educational opportunities for professionals in the field and for efficient use of the individual's time. The Senior Professional Program is intended to provide working professionals with an opportunity to come to Duke University either to update managerial skills or to earn a professional master's degree with a minimum period of residence. The program offers intensive courses and regular university courses for qualified professionals.

Elements of the program may be taken for nondegree credit or graduate credit. Formal degree work may be carried out through a combination of approaches.

The Senior Professional Program allows the participant to tailor an educational experience to individual needs. A brief description of opportunities follows. Inquiries for further information may be addressed to the program coordinator.

Intensive Courses

The cornerstone of the Senior Professional Program, the intensive courses cover a wide variety of topics focusing on the management and analysis of forest, land, and water resources. Subject matter is changed periodically in response to the needs of working professionals. Instructors are experts who have an established reputation in their respective fields. As a result, participants are exposed to up-to-date, state of the art information that is available from few other sources.

The intensive courses are structured as week-long modules. The classes often include workshops and independent or group projects in addition to formal lectures in a classroom setting. Ample time is allowed for informal discussion with the instructor and other class members.

Professionals participating in the intensive courses are registered as nondegree students with the Duke University registrar and may earn 1 unit of nondegree credit for each week of an intensive course. Some intensive courses qualify for Continuing

Forestry Education (CFE) credit administered by the Society of American Foresters. All professionals receive a certificate of recognition upon completion of an intensive course.

Participants who are admitted to the School of the Environment as candidates for the Master of Environmental Management or Master of Forestry degree through the Senior Professional Program may take certain intensive courses as part of degree requirements. These students may earn 1 unit of degree credit for each week of an intensive course.

Intensive courses are listed in a special section in the chapter "Courses of Instruction" in this bulletin. A brochure describing the Intensive Course Program, courses offered during a particular semester, registration procedures, and fees is available upon request.

Master's Degrees for Professionals

Qualified professionals may be admitted to the School of the Environment as part-time students. By taking a three-month leave of absence from their jobs, these professional degree candidates spend a full semester at Duke enrolled in regular, graduate level courses. Up to 15 units of academic credit are taken during this time. The remaining 15 or more units of credit needed for a Master of Environmental Management or Master of Forestry degree may be earned in absentia or on campus as career responsibilities permit. Part-time degree candidates have up to five years in which to complete all requirements.

Specific degree requirements for students in the Senior Professional Program, including required courses and the number of academic units necessary to complete the degree, are established by the education committee upon evaluation of the individual's previous education, working experience, and career goals. A minimum of one semester in residence and 30 units of credit are required. A master's project, which may be completed in absentia, representing 4 to 6 units of credit also is required.

Applicants for degrees through the Senior Professional Program follow the same application procedures as regular students in the school. Applications should be submitted by 15 February for the fall term and by 15 October for the spring term. Normally, degree candidates in the Senior Professional Program take the required semester in residence during the term following admission.

Senior Professional Program degree candidates are not eligible for financial assistance from the School of the Environment but may be eligible for federally funded student loans.



Career Planning and Placement



Placement

The School of the Environment operates its own career planning and placement services for all graduate and professional students and alumni of the school. Assistance is given to students in finding summer employment and internships, permanent employment upon graduation, and mid-career changes of employment.

Career Planning Seminars. Individual counseling and group workshops are provided by a professional staff member to assist students in the development of job search strategies and skills, resume preparation, and interviewing techniques. Presentations by alumni of the school enable students to discuss employment options with practicing natural resource professionals.

Internships. Although the School of the Environment does not require internships, students are strongly encouraged to explore career options and enhance their professional training through paid internships with public or private sector natural resource employers. The Office of Placement and Internship has information on a variety of options that students may consider when arranging practical training. See also the section on internships in the chapter, Additional Educational Opportunities.

Job Search Assistance. The Office of Placement and Internship maintains a current listing of employment opportunities from private industry; local, state, and federal governments; universities; and nonprofit organizations. Career planning and placement resource materials are housed in the office. Both current students and graduates are encouraged to use the alumni network established to offer placement assistance.

A resume book is published annually by the school and distributed nationally to potential employers. Students are encouraged to prepare and submit resumes, with the assistance of the staff, for publication. Employer response to the resume book has been favorable, and many students have received initial contacts and invitations to interviews as a result.

The placement office also invites representatives from a number of firms and government agencies from throughout the country to visit the school to interview students for internships and permanent positions. Students are strongly urged to begin formulating their job-hunting strategies and implementing the job search at least six months prior to graduation.

Employment Offers. The success experienced by degree candidates in securing employment serves as a strong testimony to the value of graduate/professional study at Duke. Students are advised to gear their education to a specialized area in order to increase their marketability. Toward this goal, every effort is made to place each student



in a paid summer internship appropriate to his or her field of study and geographic preference. Summer placements with local organizations may be continued as part-time positions during the student's second year of study, adding to the base of professional experience.

Beginning salaries vary, depending upon the educational specialization, capabilities, and prior experience of the candidate as well as the type of organization and geographical region in which he or she is employed. For recent graduating classes, beginning salaries have ranged from \$24,000 to \$50,000 annually with candidates having some prior experience and/or advanced quantitative skills commanding the higher figures.

Graduates of the school have an excellent record of finding challenging, satisfying employment within their areas of interest. A large percentage of recent graduates have accepted positions with environmental consulting firms. Others work with government agencies, nonprofit organizations, forest products industries, and other corporations.

The market for natural resource managers is expanding. In both the private sector, where environmental divisions are being established within traditional corporations, and in the public sector, where policy-making bodies increasingly face environmental concerns, School of the Environment graduates are hired in research, planning, administrative, and consulting capacities. To a smaller degree, international organizations utilize natural resource managers; students interested in international employment usually benefit from experience such as that gained through the Peace Corps. The following is a list of selected organizations with which graduates of the past several years are affiliated.

American Cyanamid, Inc.
 American Rivers
 Archibald Biological Station
 BASF Corporation
 Battelle, Pacific Northwest Laboratories
 Bechtel
 Boise Cascade Corporation
 Booz, Allen and Hamilton, Inc.
 Camp, Dresser and McKee, Inc.
 Canal Forest Resources
 Champion International Corporation
 ChemRisk
 Chesapeake Bay Foundation
 Colorado State University
 Consulting Services, Inc.
 Dames and Moore
 Duke University, School of the Environment
 Duke University, Office of Occupational and
 Environmental Safety
 Ecology and Environment, Inc.
 E. I. DuPont de Nemours and Company
 ENSR Consulting
 ERM, Inc.
 Environ, Inc.
 Environmental Defense Fund
 Ernst and Young National Environmental Practice
 Freshwater Institute
 General Motors
 Georgia-Pacific Corporation
 Great Lakes Protection Fund
 Hancock Timber Resource Group
 ICF, Inc.
 Inform
 International Paper Company
 Labatt Anderson, Inc.
 Maine State Planning Office
 MacArthur Foundation
 Malcolm Pirnie, Inc.
 Massachusetts Division of Water Supply
 McLaren/Hart
 Merck & Company, Inc.
 Metcalf and Eddy
 Midwest Research Institute
 National Forest Products Association
 National Oceanic and Atmospheric Administration
 National Recycling Coalition
 Natural Resources Council
 Natural Resources Research Institute
 The Nature Conservancy
 City of New York, Department of Environmental
 Protection
 North Carolina Coastal Federation
 North Carolina Cooperative Extension Service
 North Carolina Department of Environment,
 Health and Natural Resources
 North Carolina Sea Grant
 North Carolina Wildlife Resources Commission
 Oak Ridge National Laboratory
 Ohio State University
 Oregon State University
 Organization of American States
 Pacific Gas and Electric Company
 PRC Environmental, Inc.
 Procter and Gamble, Inc.
 Radian Corporation
 Rain Forest Alliance
 Research Triangle Institute
 Resources for the Future
 Roy F. Weston, Inc.
 SAIC
 South Carolina Water Resources Commission
 Southern Natural Gas Company
 Teton Field School
 Texas Land Office
 TRC Environmental
 United States Agency for International Development
 United States Department of Agriculture, Forest
 Service
 United States Department of the Army
 United States Department of the Interior, Geological
 Survey
 United States Department of the Interior,
 National Park Service
 United States Department of Labor, Occupational
 Health and Safety Administration
 United States Environmental Protection Agency
 United States Peace Corps
 Versar
 Virgin Islands Biosphere Reserve
 Virginia Department of Forestry
 W. Alton Jones Foundation
 Westvaco Corporation
 Weyerhaeuser Company
 Woodward-Clyde Consultants
 World Health Organization
 World Resources Institute
 World Wildlife Fund
 Worldwatch Institute

Student Life



Housing

While limited housing is available on campus, most students in the School of the Environment join the annual scramble to find a place to live off campus. The university is very much a part of the urban environment that is Durham, but the campus is not an urban one. It is not traversed by streets with housing and businesses. Consequently the perimeter of the West Campus is densely developed with apartment complexes, and the East Campus is adjacent to a neighborhood of large, early twentieth-century homes, some of which have been converted to apartments. Free bus service is available between the two campuses.

The Department of Housing Management operates an off-campus housing service which consists of a staff person who maintains listings of apartment openings, house rentals, and "roommates wanted." The off-campus housing service does not rate the quality of apartments, houses, or landlords, nor arrange viewings. Similarly, the Office of Enrollment Services in the School of the Environment maintains a listing of houses and apartments popular with students in the school as well as a list of entering students who are interested in finding roommates. These lists are mailed to students during the summer.

Services for Students

Medical Care. The main components of the student health service include the University Health Services Clinic, located in the Pickens Building on West Campus, and the student infirmary in Duke Hospital South. Emergency transportation, if required, can be obtained from the Duke campus police. The facilities of the university health services clinic are available during both regular and summer sessions. The facilities of the student infirmary are available only from the opening of the university in the fall until graduation day in the spring.

The student health fee is nonrefundable after the first day of classes. Students may be covered during the summer for an additional charge. Dependents and family members are not covered at any time.

The resources of the Medical Center are available to all students and their spouses and children. Charges for all services received from the Medical Center are the responsibility of the student.

The university has an Accident and Sickness Insurance Plan available for full-time students. Although participation in this plan is voluntary, the university expects all graduate students to be financially responsible for medical expenses above those covered by the student health service. Students who have medical insurance or wish to accept the financial responsibility for any medical expense may elect not to join the Accident and Sickness Insurance Plan by signing a statement to this effect. Each full-time student in residence must purchase this student health insurance or indicate the alternative arrangement.

The Student Accident and Sickness Insurance Plan provides protection twenty-four hours a day during the twelve-month term of the policy. Students are covered on and off the campus, at home, while traveling, and during interim vacation periods. For additional fees a student may obtain coverage for a spouse or spouse and children. Term of the policy is from opening day in the fall.

Coverage and services are subject to change as deemed necessary by the university.

Counseling and Psychological Services. CAPS provides a comprehensive range of counseling and psychological services to assist and promote the personal growth and development of Duke students. The professional staff is composed of clinical social workers, psychologists, and psychiatrists experienced in working with young adults. Among services provided are personal, social, and academic counseling. A number of short-term seminars or groups focusing on skills development and special interests such as coping with stress and tension, fostering assertiveness, enriching couples' communication, and dealing with separation and divorce are also offered. A policy of strict confidentiality is maintained concerning each student's contact with the CAPS staff. Individual evaluation and brief counseling/therapy as well as skills development seminars are covered by student health fees. There are no additional charges to the student for these services.

Appointments may be made by calling 660-1000 or visiting CAPS, 214 Page.

Career Development Center. The Career Development Center, located in Page Building on West Campus, offers a number of integrated services that address a range of student needs from indecision about career choices to assistance with the post-graduate job search. Although many of the services are designed primarily for undergraduates, graduate and professional students are also encouraged to register with the center and use its resources as their career plans evolve.

Students who are unsure of their career plans can obtain confidential counseling to help them better understand themselves and clarify career goals. Individual appointments with counselors are available, as are group workshops, testing, and computerized career guidance programs.

The Career Resources Library, 217 Page, has resources to help students choose careers or further training and education, as well as self-help materials for improving study techniques, time management, test-taking and reading comprehension.

The Office of Placement Services, 110 Page, serves as a liaison between Duke students and potential employers. Services offered include placement seminars and workshops, on-campus interviewing opportunities with employers and graduate/professional schools, position vacancy notices, a library of employer resources, and individualized placement counseling. To participate in job interviews scheduled throughout the year, students must be registered with the office and have assembled a permanent file.

In addition, the school maintains its own Office of Placement and Internship. For further information, see the Placement section in this bulletin.

International Adviser. The International House handles governmental matters for students from abroad such as statements of attendance for home governments, issuance

of United States immigration forms for re-entry into the country after a temporary absence, and required yearly extensions of time. Any new student who is not a citizen of the United States should report with passport to the international adviser soon after arrival. The International House is located at 2022 Campus Drive.

Other Services. The Bryan University Center houses an information desk, two drama theaters, a film theater, stores for books and supplies, meeting rooms, lounges, snack bars, and other facilities. A barbershop, hairdresser, post office, and bank are also located in the center and in the nearby West Campus Union.

Student Organizations and Activities

Sports. Students are welcome to use such recreational facilities as the swimming pools, tennis courts, golf course, track, jogging course, handball and squash courts, gymnasias, weight room, and playing fields. Intramural programs provide an opportunity to participate in informal and competitive physical activity. A variety of clubs for gymnastics, scuba diving, sailing, cycling, badminton, karate, rugby, soccer, and crew are also active.

FOREM Club. The FOREM Club is the student organization for coordination of the school's social functions, community service, and intramural team participation. FOREM is an acronym for Forestry and Environmental Management. Annual functions of the club include a Christmas party, Christmas tree sale, Field Day, and year-end banquet.

Student Advisory Committee. The Student Advisory Committee, an elected student group in the School of the Environment, meets regularly with the dean and faculty representatives to discuss courses and curriculum, programs, and long-range goals of the school.

Graduate and Professional Student Council. The Graduate and Professional Student Council is the university-wide representative body for students registered in the various professional schools and departments of the Graduate School. The council provides a means of communication among graduate students, presents graduate student concerns to the administration, and selects students for membership on university committees. Representatives from the School of the Environment are elected annually by the student body.

Professional and Scientific Societies. Students are encouraged to participate in one or more professional or learned societies appropriate to their academic interest. Many of these societies are interested in participation by students and offer a lower fee to encourage student membership. Student chapters of the Society of American Foresters, International Society of Tropical Foresters, National Association of Environmental Professionals, and the American Water Resources Association are active in the school.

Religious Services. Interdenominational services are conducted on Sunday mornings in Duke Chapel. Roman Catholic masses are offered daily on campus. Several Protestant denominations have student centers on campus. The Divinity School conducts other chapel services and religious and social activities. There is also a Hillel group which meets regularly.

Cultural Activities. Concerts, recitals, lectures, plays, films, and dance programs are presented frequently on campus. Information on major events is available at Page Box Office or the Bryan Center information desk. The University Museum of Art, which has some excellent permanent collections, is located on East Campus.

Academic Regulations



Planning

The responsibility for the specific content of the academic plan of study rests with the student. A thorough familiarity with and understanding of the regulations contained in this bulletin as well as other sources provided by the school are essential to sound planning.

During the fall term each student is assigned a permanent faculty adviser. The adviser should be consulted in planning a course of study. Other members of the faculty, particularly those concerned with the plan of study, should also be consulted on an informal basis. Reassignment to another adviser can be obtained, but only when approved by the assigned adviser and the prospective adviser.

Registration

Entering students who register for the Master of Environmental Management or Master of Forestry degree will receive instructions by mail from the School of the Environment a few weeks before the start of the fall term. Registration should be completed during the orientation week. Students in residence register for succeeding semesters at times scheduled in the university calendar.

Registration is approved by the adviser and processed by the university registrar. Registration is required in order to take courses for credit or audit. To establish eligibility for university and other loans, for the student health service, and for study and laboratory space, a student must be registered. All tuition and fee payments and any indebtedness must be settled before registration will be completed.

Late Registration. All students should register at the times specified by the university. The charge for late registration is \$25.

Change of Registration. With approval of the adviser, the student can change registration for a period of ten days at the beginning of each semester.

Refunds. Tuition refunds are governed by the policy stated in the chapter on financial information.

Graduate School Registration. Students in A.M., M.S., or Ph.D. degree programs register through the director of graduate studies of the Department of the Environment. Registration requirements and procedures are described in the section on graduate degrees of this bulletin and in the bulletin of the Graduate School.

Reciprocal Agreements. Students enrolled full-time in the School of the Environment or in the Graduate School during the regular academic year may enroll for six hours of credit per semester at the University of North Carolina in Chapel Hill, North Carolina State University in Raleigh, or North Carolina Central University in Durham provided that they are also registered for at least six hours of credit at Duke during the same semester. Similarly, graduate students in these schools may take up to six hours per semester at Duke. A student enrolled for two or more courses during a summer at Duke may take one of the courses at one of the neighboring institutions under the reciprocal agreement. This agreement does not apply to contract programs such as the American Dance Festival. The student must pay any special fees required of students at the host institution and provide his or her own transportation.

Immunization Requirement

The North Carolina immunization law requires students entering a college or university in the state to be immunized against the following diseases: measles, rubella, tetanus, diphtheria and, in some cases, polio. Each entering student is required to present proof of these immunizations in accordance with the instructions contained in the Student Health Services form provided with the student's matriculation material. This form should be completed and returned to Student Health Services prior to the student's first day of classes. Duke University cannot permit a student to attend classes unless the required immunizations have been obtained.

Courses

Course Descriptions. Courses offered by the school are described in the final section of this bulletin. However, courses are subject to change. A list of courses to be offered during a particular term, as well as schedules of courses offered in other departments at Duke and at neighboring universities, are available from the Office of Enrollment Services prior to registration for that term.

Independent Study. All students are expected to place increasing emphasis on independent study as they near completion of residence. ENV 299 lists a number of independent project areas. Several students can work together under the supervision of a faculty member by registering for ENV 200.

Master's Project. All students must complete a master's project of 4 to 6 credits. The project should be identified during the first term of study and initiated during the second and third terms. No student will be permitted to register for the fourth term of study until a project proposal has been approved by the student's adviser and has been received by the school's enrollment services office. During the final two terms major emphasis should be placed on the project. In completing the project, the student applies theoretical and analytical training acquired during the two years of study on actual natural resource or environmental problems. If desirable, arrangements can be made by the student or the school for consultation with other organizations concerning the scope and objectives of the project.

Students maintain close contact with their advisers during the development and writing of the master's project. Projects should reach final stages of completion by midterm of the final semester in residence. *A final draft of the project must be delivered to the adviser prior to 1 November for those graduating in December, prior to 1 April for those*

graduating in May, and prior to 1 August for those graduating in September. The adviser is responsible for critical assessment and grading.

Auditing. Students registered for a full course load may audit courses free of charge. Otherwise, the audit fee is \$625 per course. Written permission of the instructor prior to registration for the course is required. Audited courses must be so indicated on the registration card. In classes where enrollment is limited, students enrolled for credit will receive priority. Audited courses are recorded without grade on the student's permanent record. Regular attendance is expected. Changes from audit to credit are not permitted after the drop/add period. The period for dropping and adding courses is limited to the first ten calendar days of the fall and spring semesters. During the summer, dropping or adding of courses is limited to the first three days of the term. Students are advised to make all class changes on the first day of class if at all possible. *Except under unusual circumstances, and with special permission of the dean, no reduction of tuition and fees is permitted unless classes are dropped on the first day of the drop/add period.*

For the special intensive courses, students may register during the semester two weeks prior to the first day of the course. Students may not register for more than two intensives in a semester without permission of their adviser and the intensive course coordinator. Students who wish to drop an intensive must do so prior to the first day of the course.

Retaking Courses. Courses required as a part of the program elected by the student or required by the adviser must be retaken if failed. Courses prerequisite to more advanced courses the student wishes to elect must be retaken if failed. Elective courses may be retaken if the student wishes to do so. See the section on grades, below, for additional information.

Credit Hours

Candidates for the professional degrees are considered fully registered when they enroll full-time for the number of semesters required in their individual degree programs. The normal registration to reach the required minimum units of credit is 12 units per semester, although a variation from 9 to 15 units is common. Students must have the permission of their adviser to register for more than 15 units in a semester, and all students who wish to enroll for fewer than 9 units must make a formal request to the education committee to study part-time.

Summer Registration. Professional degree candidates are normally not required to register for summer courses. However, a student who wants to supplement his or her graduate work with courses during the summer may do so through the Duke University Summer Session office. The cost is at the part-time rate per unit, and a summer health fee is assessed for students studying on campus. Summer registration does not affect the number of units, semesters in residence, or flat-fee tuition for the regular academic year.

Grades

The grading system used in the School of the Environment and the Graduate School is as follows: *E* (exceptional); *G* (good); *S* (satisfactory); *F* (failing); *I* (incomplete); *Z* (continuing).

The grades of *P* (pass) and *F* (fail) are used in the School of the Environment for seminars and modular courses. At the instructor's option, the grades of *P* or *F* or regular letter grades are used for intensive courses, independent projects, and master's projects. The grade of *Z* is assigned for an independent project or a master's project which extends over a period of more than one semester; a final grade is given upon completion of the project. Credit hours for a course completed on a pass/fail basis are creditable toward the master's degree as long as the course is not required in the student's major area of

study. Permission for the pass/fail option must be obtained in writing from the instructor upon registration for a course.

Incomplete Grades. A grade of *I* indicates that some portion of the student's work is lacking, for an acceptable reason, at the time grades are reported. Requirements of all courses in which a grade of Incomplete is assigned by an instructor must be fulfilled within one calendar year following the date of the assignment of the incomplete grade.

In exceptional circumstances, upon recommendation of the professor who as signed the grade of Incomplete, the education committee may extend the time for completion of the course requirements. If, in the judgment of the professor and the student's adviser, completion of the requirements is not a reasonable alternative for the student, the student may petition the education committee to allow the grade of *I* to stand permanently on his or her record. No student will be allowed to graduate with an Incomplete unless permission has been granted for it to stand permanently on the record.

Failure. Any course for which a failing grade is received must be retaken or replaced with a substitute course. A substitute course requires the approval of the student's adviser and the education committee. Both the original failing grade and the grade received for the retaken or substitute course will appear on the student's transcript. Failure of a course also subjects the student to dismissal (see the sections on probation and dismissal and automatic dismissal).

Probation and Dismissal. Students are subject to dismissal from the school under any one or a combination of the following factors:

1. no grades higher than *S* during the first semester of study;
2. less than 6 units of *G* and/or *E* grades during the first full year of study;
3. a grade of *F* in any course at any time.

An appeal may be submitted through the adviser to the education committee to continue study under a probationary status. Probationary terms, set by the adviser, must be specific in the appeal and the appeal must be approved by the education committee. If probationary terms are met, the student will be returned to regular status. If probationary terms are not met, the student will be dismissed. Students will not be awarded degrees while on probationary status.

Automatic Dismissal. A student is automatically dismissed upon failure of more than one course.

Academic Irregularities

All cases falling outside the regular policies and procedures of the school are referred to the education committee for decision. The work of the committee includes review and decision regarding course requirements for graduation, student probation and withdrawal, student petitions for waivers of degree requirements, and all actions which deviate from established academic regulations.

A student who desires to petition the committee should do so by writing to the chairman. A precise statement of the reason for the request is required. The student will be notified in writing of the decision of the committee by the chairman.

Transcripts of Credit

A student who is registered for a course and who successfully completes the requirements as prescribed by the instructor receives credit on university records. A transcript fee, charged to all students during their first semester in residence, covers all future transcript requests. Transcripts of credit are issued only by the university Registrar, 103 Allen Building. Requests for transcripts, sent directly to the registrar, should state clearly the full name under which the work was taken, the dates of attendance, and

to whom the transcripts are to be sent. The student must sign the request for release of a transcript. No transcripts will be issued for students who fail to clear all financial obligations to the university upon graduation.

Length of Study

For a full-time student, the normal time for completing a professional master's degree is four semesters. Exceptions may be made for students who have an undergraduate degree in forestry and for students enrolled in the Senior Professional Program. No student, either full-time or part-time, is allowed more than five years to complete the requirements for the master's degree.

Leave of Absence or Withdrawal

Occasionally, special circumstances require a student to leave the university for one or two semesters at a time. If the reason for the departure is considered an emergency, the student may request a leave of absence for a period not to exceed one year. If the reason is to study elsewhere in a combined degree program, a leave will be granted for the length of study. If the student plans to do field studies or an internship, he or she must maintain university enrollment by paying a registration fee each semester of the academic year until full-time study is resumed.

Under all circumstances, the student must request the leave for a specific length of time prior to departure from the university. Extensions must be requested if they are required. Failure to request a leave or an extension of leave may result in a penalty charge and/or dismissal from the university. A student is eligible to request a leave of absence only after having completed at least one semester of study.

A student who wishes to withdraw must make a written request to do so. For refunds upon withdrawal, see the chapter on financial information.

Application for the Degree

Even if degree plans are tentative, a candidate for a degree must file an application for the degree no later than the end of the sixth week of the semester in which the degree is to be received. For a degree to be awarded in September, application must be filed no later than the beginning of the second summer session. The application for the degree is valid only for the semester in which it is filed. If the student does not receive the degree as expected, he or she must file a new application.

Graduation

All candidates are urged to attend the commencement exercises at which their degrees are to be awarded. A student who is unable to attend is required to file a petition with the dean, not later than four weeks prior to commencement, seeking permission to receive the degree in absentia.

Debts

Students are expected to meet all financial obligations to the university prior to completion of the degree. Failure to pay all university charges by the due dates specified by the university will bar the student from registration, class attendance, receipt of transcripts, certification of credits, leave of absence, or graduation until the account is settled in full. Further, an individual in default may be subject to withdrawal from the university.

Courses of Instruction



Course offerings are subject to change. The student should consult the current university course schedule for listings of courses to be offered each semester.

General Courses

200. Integrated Case Studies. A group of two to four students may plan and conduct integrated research projects on a special topic, not normally covered by courses or seminars. A request to establish such a project should be addressed to the case studies director with an outline of the objectives and methods of study and a plan for presentation of the results to the school. Each participant's adviser will designate the units to be earned (up to six units) and evaluate and grade the work. Variable credit. *Staff*

201. Forest Resources Field Skills. Introduction to field techniques commonly used to quantify and sample forest resources: trees, soils, water, and animal resources. Dendrology, vegetation sampling, soil mapping, river flow estimation, field water quality sampling, surveying, and use of compass. 2 units. *Davison and Richter*

204. Forest Inventory, Growth, and Yield. Measurement of land and forests for purposes of management, appraisal, purchase, and sale. Techniques for predicting the growth and future yield of stands by various methods. 3 units. *Davison*

205. Ecological Management of Forest Systems (Silviculture). The aim of the course is to equip future resource managers and environmental consultants with knowledge allowing them to propose lower impact practices to individuals and organizations who need to balance wood production with maintenance of environmental quality. Underlying principles of growth, from seed to mature trees, and stand dynamics are explored. Various alternative methods of manipulating growth, stand structure and development, ranging from little to large perturbations of forest systems, are presented and assessed in terms of their effect on resource quality. 3 units. *Oren*

205L. Ecological Management of Forest Systems (Silviculture). Same as 205 with laboratory. 4 units. *Oren*

207. Forest Pest Management. Fundamentals of entomology and plant pathology as appropriate to understanding the impacts of insects and diseases on forest produc-

tivity and their assessment for integration into forest management. Regional case examples and complexes are evaluated in terms of pest-population, forest-stand dynamics; economic and societal constraints; treatment strategies; monitoring systems; and benefit-cost analysis. This approach seeks to develop predictive capabilities in long-range pest management and decision making. 3 units. *Stambaugh*

207L. Forest Pest Management. Same as 207 with laboratory which is largely field oriented to focus on diagnostics and impact analysis. 4 units. *Stambaugh*

210. Forest Pathology. Diseases of North American forests and their timbers, with emphasis on current literature and management strategies. Offered on demand. 3 units. *Stambaugh*

210L. Forest Pathology. Same as 210 with laboratory. Field and laboratory diagnosis. Offered on demand. 4 units. *Stambaugh*

211. Applied Ecology and Ecosystem Management. An application of ecological principles to applied resource and environmental problems with an emphasis on the ecosystem as a basic working unit. Perspectives include such topics as land/water interactions, the patchiness concept, succession, energy flow, productivity, mineral cycling, perturbation effects on ecosystems, and limiting factors. Prerequisites: introductory courses in biology and ecology. 3 units. *Richardson*

212. Environmental Toxicology. Study of environmental contaminants from a broad perspective encompassing biochemical, ecological, and toxicological principles and methodologies. Discussion of sources, environmental transport and transformation phenomena, accumulation in biota and ecosystems. Impacts at various levels of organization, particularly biochemical and physiological effects. Prerequisites: organic chemistry and vertebrate physiology or consent of instructor. 3 units. *Di Giulio*

213. Forest Ecosystems. Emphasis on the processes by which forests circulate, transform, and accumulate energy and materials through interactions of biologic organisms and the forest environment. Ecosystem productivity and cycling of carbon, water, and nutrients provide the basis for lecture and laboratory. 3 units. *Richter*

215. Environmental Physiology. Examination of the concepts of tolerance, limiting factors, bioenergetics, nutrition, stress physiology, homeostasis, and alleopathy for both plant and animal life. Discussion of procedures for and examples of monitoring physiological perturbations due to resource manipulation. 3 units. *Di Giulio and Oren*

216. Applied Population Ecology. Population dynamics of managed and unmanaged populations. A quantitative approach to exploitation and conservation of animal and plant populations, including harvesting, population viability analysis, population genetics. Prerequisites: introductory statistics, calculus, and computer programming or consent of instructor. 3 units. *Maguire*

217. Tropical Ecology. Ecosystem, community, and population ecology of tropical plants and animals with application to conservation and sustainable development. Prerequisite: a course in general ecology. C-L: Botany 215 and Zoology 215. 3 units. *Terborgh*

218L. Barrier Island Ecology. An integration of barrier island plant and animal ecology within the context of geomorphological change and human disturbance. Topics include: barrier island formation and migration, plant and animal adaptations, species interactions, dune succession, maritime forests, salt marshes, sea level rise, conservation policy, and restoration ecology. Field trips to many of the major North Carolina barrier islands. Strong emphasis on field observation and independent research. (Given at Beaufort.) Prerequisite: introductory biology; suggested: course in botany or ecology. C-L: Botany 218L. 6 units. *Evans, Peterson, and Wells (visiting summer faculty)*

219L. Marine Ecology. Factors that influence the distribution, abundance, and diversity of marine organisms. Course structure integrates lectures, field excursions, and independent research projects. Topics include characteristics of marine habitats, adaptation to environment, species interactions, biogeography, larval recruitment, rocky shores, marine mammals, fouling communities, tidal flats, beaches, subtidal communities, and coral reefs. (Given at Beaufort.) Prerequisite: none; suggested introductory ecology, invertebrate zoology, or marine botany. C-L: Zoology 203L. 6 units. *Staff*

220. Vegetation Management in Urban Ecosystems (Urban Forestry). Biology and management of woody vegetation, especially trees, across the urban-forest continuum. Special uses and problems of the urban forest are discussed in terms of socioeconomic, legal, arboricultural, and environmental considerations. Management case studies and field trips will be used to gain insights into tree valuation, inventory, and municipal ordinances and administration. 3 units. *Stambaugh*

221. Soil Resources. Emphasis on soil resources as central components of terrestrial ecosystems, as rooting environments for plants, and as porous media for water. Soil physics and chemistry provide the basis for the special problems examined through the course. Laboratory emphasizes field and lab skills, interpretive and analytical. 3 units. *Richter*

222S. Coastal Processes. Waves and currents in the nearshore zone and their role in beach evolution. Linear wave theory and models for beach evolution. Other topics include nearshore currents, tides, estuarine circulation, and field techniques for measurement of nearshore morphology and fluid motions. Term project required. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32. C-L: Geology 201S. 2 units. *Howd*

223L. Behavioral Ecology. How ecological factors shape foraging, mating, aggressive, and social behavior. Laboratory experiments and field observations from the Outer Banks environment. Independent projects and seminars. Not open to undergraduates. (Given at Beaufort.) Prerequisite: introductory biology. 4 units. *Staff*

224S. Molecular and Cellular Adaptations of Marine Organisms. Marine organisms meet the challenge of living in a hostile and ever-changing environment by numerous adaptive mechanisms. Focus on the underlying cellular and molecular processes. Topics explored with regard to adaptive processes in marine organisms include changes in metabolism, respiration, and vision. The impact of environmental pollutants and human health significance will also be addressed. (Given at Beaufort.) C-L: Cell Biology 270S. 2 units. *C. Bonaventura*

225L. Coastal Ecotoxicology and Pollution. Principles of transport, fates, food-web dynamics and biological effects of pollutants in the marine environment. Laboratory to stress standard techniques for assessing pollutant levels and effects. (Given at Beaufort.) Prerequisites: introductory chemistry and biology. 4 units. *Staff*

226L. Marine Mammals. Ecology, social organization, behavior, acoustic communication and management issues. Focused on marine mammals in the southeastern United States (for example, bottlenose dolphin, right whale, West Indian manatee). Laboratory exercises will consider social organization and acoustic communication in the local bottlenose dolphin population. (Given at Beaufort.) Prerequisite: introductory biology. 4 units. *Staff*

227L. Biology of Marine Macrophytes. Physiology and ecology of seaweeds, seagrasses, marshgrasses, and mangroves. Biological flux of carbon and nutrients in coastal seas. Ecological consequences of photosynthetic adaptations. Not open to undergraduates. (Given at Beaufort.) Prerequisites: introductory biology and chemistry. 4 units. *Ramus*

228L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Not open to undergraduates. Four units (fall); six units (summer). (Given at Beaufort.) Prerequisites: introductory biology and chemistry. Variable credit. *Forward*

229L. Biochemistry of Marine Animals. Functional, structural, and evolutionary relationships of biochemical processes of importance to marine organisms. Not open to undergraduates. (Given at Beaufort.) Prerequisites: introductory biology and inorganic chemistry. 4 units. *Rittschof*

230L. Weather and Climate. Overview of the science of meteorology and principles of climatology, especially as applied to problems in ecology and natural resource management. Emphasis on the processes and characteristics of weather phenomena and local and regional climates. General introduction to sources of climatic data and climatic data analysis. Includes laboratory. 4 units. *Knoerr*

232. Microclimatology. Introduction to the micrometeorological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. Offered on demand. C-L: Botany 232. 3 units. *Knoerr*

234L. Watershed Hydrology. Introduction to the hydrologic cycle with emphasis on the influence of land use, vegetation, soil types, climate, and land forms on water quantity and quality and methods for control. Development of water balance models. Analysis of precipitation patterns, rainfall and runoff, and nonpoint source impacts. Statistical handling and preparation of hydrologic data, simulation and prediction models, introduction to groundwater flow, laboratory and field sampling methods. 4 units. *Staff*

235. Air Quality Management. Types, sources, effects of air pollutants. Regulatory framework emphasizing the Clean Air Act Amendments of 1990 and federal, state, local agency implementation. Application of risk assessment, technology, market incentives to air management. Scientific, policy aspects of acid deposition, global climate change, indoor air, mobile sources control. Dispersion modeling, exposure assessment. 3 units. *Vandenberg*

236. Water Quality Management. Types, sources, and effects of pollutants. Water quality standards and criteria. Engineering approaches to water management. Mathematical models and their application to water quality management. Federal regulations, in particular, the Federal Water Pollution Control Act and the Safe Drinking Water Act. Policy analysis for water quality management planning. 3 units. *Reckhow*

240. Fate of Organic Chemicals in the Aquatic Environment. Kinetic, equilibrium, and analytical approaches applied to quantitative description of processes affecting the fate of anthropogenic and natural organic compounds in surface and groundwaters and in selected treatment processes, including sorption phenomena, gas transfer, hydrolysis, photochemistry, oxidation-reduction, and biodegradation. Sampling, detection, identification, and quantification of organic compounds in the environment. Gas and liquid chromatography and mass spectrometry. Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Civil Engineering 240. 3 units. *Dubay and Faust*

241. Atmospheric Chemistry and Air Pollution. Chemical kinetics and equilibrium applied to the mechanistic and quantitative description of processes affecting the fates of anthropogenic and natural chemicals in the troposphere, on local, regional, and global scales. Direct photolysis; gas-phase photo-formation and fates of ozone, radicals, and other oxidants; gas-phase oxidations of volatile organic compounds; gas-to-drop partitioning; aqueous-phase photoformation and fates of hydrogen peroxide, radicals, and

other oxidants in the aqueous phases of clouds, fogs, and aerosols; effects of aqueous-phase reactions on the chemical composition of the troposphere; gas-phase and aqueous-phase oxidations of organic and inorganic compounds; stratospheric ozone depletion. Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Civil Engineering 241. 3 units. *Faust*

242. Environmental Aquatic Chemistry. Principles of chemical kinetics and equilibria applied to quantitative description of the chemistry of lakes, rivers, oceans, groundwaters, and selected treatment processes. Equilibrium, steady state, and other kinetic models applied to processes such as the carbonate system, coordination chemistry, precipitation and dissolution, oxidation-reduction, photochemistry, adsorption, and heterogeneous reactions. Prerequisite: university-level general chemistry within last four years. C-L: Civil Engineering 242. 3 units. *Faust*

243. Environmental Biochemistry. Introduction to the (macro)molecules of life and fundamental metabolic pathways. Topics are presented in the context of environmental perturbations. Fundamental aspects of energetics, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Emphasis on mechanisms of adaptation, molecular controls, and responses to toxicants. (Given at Beaufort.) Prerequisite: organic chemistry. C-L: Cell Biology 243. 3 units. *Bonaventura and Brouwer*

244. Cellular and Molecular Research Techniques. Introduction to the use of electrophoresis, chromatography, enzymology, equilibrium assays, rapid reaction kinetics, microscopy, molecular graphics, and various modes of spectroscopy in analyzing molecules and tissues of organisms collected from polluted and pristine environments. The applicability of techniques of modern molecular biology are discussed in relation to other research techniques used to examine fundamental molecular mechanisms and the adverse effects of pollutants on natural processes. (Given at Beaufort.) Prerequisite: organic chemistry. C-L: Cell Biology 244. 3 units. *Bonaventura and Brouwer*

245. Ecology of Microorganisms. Factors affecting the abundance, distribution, and behavior of microorganisms. Topics include microbial form and function, activities in the environment, and applications to current environmental issues. 3 units. *Shafer*

246. Survey of Occupational Health and Safety. Occupational risks associated with biological, chemical, ergonomic, radiation, and toxic hazards. The nature and scope of occupational hazards, health effects, and risk assessment and management strategies. Open to undergraduates by consent. 3 units. *Staff*

247. Survey of Environmental Health and Safety. Environmental risks from the perspective of global ecology, biology, chemistry, and radiation. The nature and scope of environmental hazards, environmental impacts and health effects, and risk assessment and management strategies. Open to undergraduates by consent. 3 units. *Staff*

248. Solid Waste Engineering. Engineering design of material and energy recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Application of systems analysis to collection of municipal refuse. Major design project in solid waste management. Prerequisite: Civil Engineering 124L or consent of instructor. C-L: Civil Engineering 248. 3 units. *Vesilind*

251. Statistics and Data Analysis in Biological Science. Elements of statistical inference and estimation including exploratory data analysis, regression, and analysis of variance. Emphasis on biological science applications. Not open to students who have had Mathematics 136 or Statistics 110A, 110B, 112, 113, 114, 210A, or 213. C-L: Statistics 210B. 3 units. *Staff*

252L. Techniques in Environmental Data Analysis. Techniques commonly used by environmental scientists for the analysis of spatial and/or temporal series of data.

Topics include regression, Fourier analysis, spectral and cross-spectral analysis, and empirical orthogonal functions. Emphasis on developing a hands-on understanding of the methods and correct interpretation of results. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32 (introductory calculus). C-L: Geology 222L. 4 units. *Howd*

253. Biometry. A practically oriented overview of the statistical analysis of biological data. Topics include data collection and experimental design, methods and techniques of data organization, use of computing programs and packages, applications of appropriate parametric and nonparametric statistical techniques, assumptions and problems encountered with biological data analysis, and interpretation of results. Prerequisite: Mathematics 136, Psychology 117, Sociology 133, Statistics 10D, 110, 112, 114, 213, or equivalent. 3 units. *Gerhart and White*

254. Advanced Research Training in Marine Molecular Biology and Biotechnology. Modern molecular biology taught in lectures and laboratory exercises using fish, molluscs, algae, and other marine forms. Topics and techniques include DNA, RNA and protein assays; techniques of gene transfer, amplification and mapping; plasmid isolation; genomic library screening and bacteriological and cell culture techniques. (Given at Beaufort.) Prerequisites: biochemistry and cell biology or equivalent; for undergraduates, consent of instructor required. C-L: Cell Biology 235. 4 units. *Staff*

254L. Advanced Research Training in Marine Molecular Biology and Biotechnology. Same as 254 with laboratory. C-L: Cell Biology 235L. 6 units. *Staff*

255. Applied Regression Analysis. Linear regression using both graphical and numerical methods. Model construction, critique, and correction using graphical residual analysis. One-way and two-way analysis of variance; introduction to design of experiments. Use of a standard statistical software package. Applications and examples drawn from various sources, emphasizing the biological and environmental sciences. Prerequisite: introductory statistics. C-L: Statistics 242. 3 units. *Staff*

260. Western Field Trip. One-week trip to observe land management and utilization practices in the western United States. Exposure to ecological, economic, and policy issues, as well as watershed, wildlife, and land use questions. Consent of instructor required. 1 unit. *Staff*

261. Remote Sensing for Resource Management. An examination of remote sensing systems as sources of information in resource management with an emphasis on aerial photography and multispectral scanners. Emphasis on the interpretation of airborne and space imagery. 3 units. *Davison*

262. Forest Utilization Field Trip. Introduction to utilization in the managed forest and the principal wood-using industries. Taught as a one-week field seminar. May be taken by nonforestry majors. 1 unit. *Staff*

266. Ecology of Southern Appalachian Forests. Field trips to various forest ecosystems in the southern Appalachian Mountains. Species identification, major forest types, field sampling, and history of effects of human activities. Consent of instructor required. 1 unit. *Richter*

270L. Resource and Environmental Economics. The application of economic concepts to private- and public-sector decision making concerning natural and environmental resources. Intertemporal resource allocation, benefit-cost analysis, valuation of environmental goods and policy concepts. Includes laboratory. Prerequisite: introductory course in microeconomics. C-L: Economics 270L and Public Policy Studies 272L. 4 units. *Kramer*

271. Economic Analysis of Resource and Environmental Policies. Case and applications oriented course examining current environmental and resource policy issues.

Benefits and costs of policies related to sustaining resource productivity and maintaining environmental quality will be analyzed using economic and econometric methods. Topics include benefit-cost analysis, intergenerational equity, externalities, public goods, and property rights. Prerequisite: Environment 270L or equivalent; Economics 149 recommended. C-L: Economics 272. 3 units. *Staff*

272. Evaluation of Public Expenditures. Basic development of cost benefit analysis from alternative points of view, for example, equity debt, and economy as a whole. Techniques include: construction of cash flows, alternative investment rules, inflation adjustments, optimal timing and duration of projects, private and social pricing. Adjustments for economic distortions, foreign exchange adjustments, risk and income distribution examined in the context of present value rules. Examples and cases from both developed and developing countries. C-L: Economics 261 and Public Policy Studies 261. 3 units. *Conrad*

274. Resource and Environmental Policy. Development of a policy analysis framework for studying resource and environmental policy. Political institutions, interest group theory, public choice theory, role of economics in policy analysis, ethics and values. Application to current and historical U.S. policy issues. Prerequisite: Environment 270L, Public Policy Studies 272, or consent of instructor. C-L: Public Policy Studies 274. 3 units. *Staff*

276. Marine Policy. Formal study of policy and policy-making concerning the coastal marine environment. History of specific marine-related organizations, legislation, and issues and their effects on local, regional, national, and international arenas. Topics explored through use of theoretical and methodological perspectives, including political science, sociology, and economics. Consent of instructor required. (Given at Beaufort.) C-L: Public Policy Studies 197. 3 units. *Orbach*

277. Conservation and Sustainable Development I: Concepts and Methods. Agromomic, ecological, and economic concepts of sustainability, with emphasis on application in developing countries; forest, soil, and wildlife resources; models in conservation biology; historical, cultural, and sociological perspectives; policy analysis. 3 units. *Staff*

278. Conservation and Sustainable Development II: Integrated Problem Solving. Approaches to reconciling conservation and development, with emphasis on developing countries. Case studies; project formulation, implementation, and evaluation; institutional policy formation; conflict resolution. 3 units. *Staff*

282S. Environmental Ethics. Selected topics involving values and the environment, for example, extending morality to nature, rights of future generations, environmental aesthetics, diversity and stability, ideological biases in ecological knowledge. Consent of instructor required. C-L: Philosophy 289S. 3 units. *Cooper*

285. Land Use Principles and Policy. Consideration of four major roles of land in the United States: as a producer of commodities, financial asset, component of environmental systems, and location of development. Analysis of market allocation of land, market failure, role of public planning and regulation. C-L: Public Policy Studies 285. 3 units. *Healy*

290. Physical Oceanography. Introduction to the dynamic principles of ocean circulation with an emphasis on large temporal and spatial scales of motion. Topics include wind-driven and density-driven flow, western boundary intensification, mid-ocean, shelf, and tropical circulations. Corequisite: Geology 250. Prerequisites: Mathematics 31 and 32 or consent of instructor. C-L: Geology 203, Mechanical Engineering 290. 3 units. *Lozier*

291S. Geological Oceanography. The geology of ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. (Given at Beaufort.) C-L: Geology 205S. 3 units. *Staff*

292L. Biological Oceanography. Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms. Laboratory emphasis. Not open to undergraduates. Four units (spring); six units (summer). (Given at Beaufort.) Prerequisite: introductory biology. Variable credit. *Ramus or staff*

293. Analysis of Ocean Ecosystems. The history, utility, and heuristic value of the ecosystem; ocean systems in the context of Odum's ecosystem concept; structure and function of the earth's major ecosystems. Not open to undergraduates. (Given at Beaufort.) Prerequisite: one year of biology, one year of chemistry, or consent of instructor. 3 units. *Barber*

294L. Marine Communities. Dynamics of marine communities in the context of current ecological theory. Life history strategies, competition, predation, diversity, and stability; detailed considerations of benthic and pelagic communities. Not open to undergraduates. (Given at Beaufort.) Prerequisites: introductory biology and mathematics. 4 units. *Gerhart*

295L. Marine Invertebrate Zoology. Structure, function, and development of invertebrates collected from estuarine and marine habitats. Not open to students who have taken Biology or Zoology 274L. Not open to undergraduates. Four units (fall); six units (summer). (Given at Beaufort.) Prerequisite: introductory biology. Variable credit. *Kirby-Smith*

297L. Biology of Marine Invertebrates. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips. Not open to students who have taken Biology 176L. (Given at Beaufort.) Prerequisites: Biology 21L and 22L or equivalents. C-L: Zoology 274L. 6 units. *Staff*

298. Special Topics. Content to be determined each semester. May be repeated. Variable credit. *Staff*

299. Independent Studies and Projects. Directed readings or research at the graduate level to meet the needs of individual students. Consent of instructor required. Units to be arranged. Variable credit. *Staff*

302. Models in Forest and Environmental Management. Students learn how to design and choose models for forestry and ecology. Emphasis on using models to develop strategy and evaluate options for culturing forests and related ecosystems. Subjects include timber, wildlife, water, recreation, and cash flow. 3 units. *Boyce*

305. Harvesting Effects on Productivity. Impacts of harvesting on the residual stand, soil properties, water quality, and future site productivity. The integration of harvesting into overall stand management through a full rotation is stressed. Offered on demand. 2 units. *Davison*

307. Ecophysiology of Productivity and Stress. Exploration of principles governing stand growth and its response to a variety of stresses. Emphasis on climate, soil resources, and competition. Stresses and their reliefs determined by pollution and the availability of resources as modifiers of the physiological properties of trees. 3 units. *Oren*

312. Wetlands Ecology and Management. The study of bogs, fens, marshes, and swamps. Emphasis on processes within the ecosystem: biogeochemical cycling, decom-

position, hydrology, and primary productivity. Ecosystem structure, the response of these systems to perturbations, and management strategies are discussed. A research project is required. Prerequisites: Environment 211 or equivalent and consent of instructor. 3 units. *Richardson*

313. Advanced Topics in Environmental Toxicology. Discussion of current issues. Topics vary but may include chemical carcinogenesis in aquatic animals; biomarkers for exposure and sublethal stress in plants and animals; techniques for ecological hazard assessments; and means of determining population, community, and ecosystem level effects. Lectures and discussions led by instructor, guest speakers, and students. Prerequisite: Environment 212. 3 units. *Di Giulio*

314. Integrated Case Studies in Toxicology. Students are assigned topics relative to their chosen research discipline in toxicology and are asked to develop case studies to present at a roundtable workshop. Emphasis on review and analysis of toxicological problems from a holistic (multidisciplinary) viewpoint. Offered on demand. C-L: Pharmacology 314. 1 unit. *Abou-Donia and Richardson*

316. Case Studies in Environmental and Forest Management. Structured methods for environmental and resource problem solving, including benefit-cost, statistical, and decision analyses, as well as simulation and optimization, are applied to case studies. Previous course work provides a foundation for addressing ecological, economic, ethical, and sociopolitical aspects of management issues. Students work in teams to develop operational management plans which are presented in oral and written form. Prerequisite: Environment 211, 270, 350, familiarity with a computer programming language, or consent of instructor. 4 units. *Maguire*

317. Topics in Tropical Ecology and Conservation. Discussion of current issues and ideas at the interface between basic and applied science. Lectures, seminars, and discussion with student participation. Prerequisite: Environment 217 or equivalent. 2 units. *Terborgh*

322L. Microbiology of Forest Soils. Ecology of the microbial populations of forest soils, with emphasis on rhizosphere interactions, root pathogenesis, and mycorrhizae. Includes laboratory. Offered on demand. Prerequisites: consent of instructor; mycology and bacteriology are recommended. 4 units. *Stambaugh*

330L. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air resources. Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Includes laboratory. Offered on demand. C-L: Botany 330L. 4 units. *Knoerr*

335. Water Quality Modeling. Development and evaluation of simulation models of surface water quality. Mechanistic descriptions of aquatic ecosystems and materials transport. Statistical methods for monitoring design and trend detection. Uncertainty analysis. Prerequisites: Environment 236 and 350. 2 units. *Reckhow*

340. Biohazard Science. Philosophy of safety; etiology, infectivity, and transmissibility of disease; immunity and resistance; occupational and nosocomial infections; aerobiology; biotechnology; disinfection and sterilization; biocontainment and facility design; and safety management. Prerequisite: general microbiology or consent of instructor. 3 units. *Tulis*

341L. Methods in Biohazard Science. Fundamentals of disinfection, sterilization, and biocidal materials methodology, inactivation kinetics and dosimetry; medical waste management; mutagenicity, pyrogenicity, and PCR testing; laminar flow cabinet certification; microbiologic surface and air sampling; respirator assessment; laboratory audits

and regulatory compliance. Prerequisite: Environment 340 or consent of instructor. 4 units. *Staff*

342. Bioaerosols. Principles of aerobiology; sick-building syndrome and building-related illness; ventilation, filtration, and humidification systems; chemical and biological pollutants; health effects; sampling and assessment of bioaerosols; remediation measures; handling indoor air quality perceptions. Consent of instructor required. 2 units. *Thomann and Tulis*

343. Hazard Management, Law, and Ethics. Economics and ecology; survey of federal and state laws; legal basis for regulation; enforcement, including inspections and audits, permits and licensing, and citations, injunctions, and penalties; management accountability; ethics in science and medicine; risk assessment and management; policy development and implementation. Consent of instructor required. 3 units. *Warren*

351. Computer-Based Map Analysis with Geographic Information Systems. Introduction to computer-based map analysis systems (geographic information systems). Use of map algebra in computer analyses of spatially distributed map information. Applications in analyzing and solving natural resource management problems. 3 units. *Knoerr*

355. Optimization Methods for Resource Management. Introductory survey of optimization techniques useful in resource management and environmental decision making. Numerical techniques for unconstrained optimization, linear programming, dynamic programming, and optimal control methods. Consent of instructor required. 3 units. *Staff*

367. Laird, Norton Distinguished Visitor Series. Examination of concepts, practices, and policies employed in the management of industrial and public forests; discussion of the problems of large-scale forest management. 1 unit. *Staff*

372. Advanced Natural Resource Economics. Methods for evaluating conservation, development, and restoration of renewable and exhaustible environmental resources. Introduction to the role of public goods and externalities in designing policies to sustain resource productivity and maintain environmental quality (developed in more detail in 373). Topics include renewable resources, exhaustible resources, intergenerational equity, property rights, and optimal control. Consent of instructor required. C-L: Economics 372. 3 units. *Staff*

373. Advanced Environmental Economics. Examination of the economic measurement of environmental benefits and damages. Consideration of economic concepts for the design of environmental policies. Topics include externality theory, public goods, contingent valuation, and hedonic models. Consent of instructor required. C-L: Economics 373. 3 units. *Kramer*

385. Decision Theory and Risk Analysis. Bayesian decision theory, including probability, subjective probability, utility theory, value of sample information, and multiattribute problems. Applications of decision theory in resource and environmental policy-making. Ecological risk assessment, including case studies. Prerequisite: Environment 251 or equivalent. 3 units. *Maguire and Reckhow*

388. Seminar in Resource and Environmental Policy. Discussion of the political, legal, and socioeconomic aspects of public and private action in environmental quality control and management. Consent of instructor required. Variable credit. *Staff*

389. Seminar in Conservation and Environmental History. Traces the evolution of conservation and environmental movements and the development of environmental ethics. History of agencies, industries, associations, and citizen groups as well as overall

policies for land and resources. Comparison of parallel developments in Canada. Consent of instructor required. C-L: History 389. 3 units. *Steen*

393. Professional Writing. Techniques in writing grant proposals, technical reports, and environmental impact statements. (Given at Beaufort.) 2 units. *Staff*

395. Coastal Environmental Speaker Series. Examination of contemporary issues in coastal environmental management. Guest speakers. (Given at Beaufort.) 1 unit. *Staff*

397. Environmental Speaker Series. Examination of contemporary issues in environmental management. Guest speakers. 1 unit. *Staff*

398. Program Area Seminar. Required seminar in each program area. Students present master's project research. Variable credit. *Staff*

399. Master's Project. An applied study of a forestry or environmental management problem or a theoretical research effort. A seminar presentation of the objectives, methodology, and preliminary findings is required. A written (or other medium) report at the conclusion of the project is also required. Undertaken with the guidance of the student's adviser. Consent of instructor required. 4 to 6 units, to be arranged. Variable credit. *Staff*

Intensive Courses

233. Air Quality Management. Understanding the Clean Air Act Amendments of 1990 and implementation activities under way principally at federal, state, and local air quality management agencies. Case studies and lectures develop concepts and hands-on familiarity with complex air quality management activities. Intensive. 1 unit. *Staff*

258. Forest Appraisal. Presentation of the principles of real estate appraisal as they apply to valuation problems in forestry. Consideration of appraisal theory, accounting and tax concepts in forest land management. Application of financial analysis techniques to forest land management through lectures and problem-solving sessions. Intensive. 3 units. *Sizemore*

259. Reporting the Results of Forestland Appraisals. Examination and critique of appraisal reports. Adherence to real property appraisal standards. Evaluation of reports emphasizing organization and concepts; the macro-side of reports. Consent of program director required. 1 unit. *Sizemore*

265. Financial Management: The Key to Sound Resource Management. Examination of aspects of managerial accounting and financial analysis crucial to decision making in the management of natural resources. Topics include concepts of accounting and cost accounting, analysis of financial statements, planning and budgeting, management control, sources and uses of funds, break-even analysis, measurement and projection of operating results, and analysis of capital investment decisions. Intensive. 1 unit. *MacKinnon*

281. Environmental Law. Examination of contemporary environmental law and its common law antecedents in the context of the American legal system. Objectives are to provide basic training in analyzing cases and statutes, applying knowledge in a classroom setting, and using a law library. Intensive. Offered on demand. 1 unit. *M. Heath*

286. Land Conservation Strategies. Knowledge, information, and identification of available resources to enable a volunteer or experienced professional to complete a land acquisition for conservation purposes. Consent of instructor required. Intensive. 1 unit. *Ludington*

287. Environmental Planning and Land Development. Overview of the land development process: how land is converted from natural or resource-based uses to urban uses; the complex web of environmental, economic, and social issues involved; the impacts of planning and environmental laws; and the players involved, including the environmental manager. Intensive. 1 unit. *Kilby*

306. Models for Landscape Forestry: Meeting Consumer Demands. Reduction of complexity of changing states of organization of forested landscapes to explicit managerial plans. Consequences of alternative plans are displayed in relationship to requirements for eco-labels and certification. Easily constructed models are designed for use with computers. Consent of instructor required. Intensive. 1 unit. *Austin and Boyce*

318. Ecological Risk Assessment: Methods and Applications. Overview of ecological risk assessment; demonstration of risk assessment of toxic chemicals to the ecological environment. Emphasis on aquatic environments through discussions and examples; case-study applications. Consent of instructor required. Intensive. 1 unit. *Di Giulio, Parkhurst, and Warren-Hicks*

333. Basic Groundwater Hydrology. Basic principles, concepts, and methods of groundwater hydrology. Topics include water storage and transmission characteristics of rocks, physical features of U.S. groundwater regions, problems related to development and protection of the groundwater resource. Intensive. 1 unit. *R. Heath*

386. Implementation of the National Environmental Policy Act on Federal Lands and Facilities. Overview of NEPA content, case law, and current issues. Discussion of methods of implementing regulations, conducting and processing an environmental impact analysis, determining the proper level of documentation to fully record and disclose results. Intensive. 1 unit. *Clark*

387. Preparing and Documenting Environmental Impact Analyses. Principles of how to acquire, assemble, analyze, and present in document form, information required by the National Environmental Policy Act. Extensive practical exercises designed to make use of realistic case study materials provided by students. Consent of program director required. 1 unit. *Magness*

Courses Outside of the School

The School of the Environment encourages students to take courses offered by other schools and departments at Duke, as well as the University of North Carolina at Chapel Hill and North Carolina State University. The following are representative of courses that are available and have been taken by students in the past few years to broaden their programs of study. For additional offerings and course descriptions, students should consult the graduate school bulletins of the three universities.

Business, Economics

Econometrics
Microeconomic Theory
Macroeconomic Analysis
Federal and Public Finance
Economic Development
International Monetary Theory
Financial Management
Industrial Organization
Financial Accounting
Benefit/Cost Analysis
Regulatory Process Management

Botany, Zoology

Phycology
Comparative Physiology
Physiological Plant Ecology
Plant Physiology
Community Ecology
Evolutionary Mechanisms
Tropical Biology
Conservation Biology

Environmental Science, Engineering

Limnology and Water Pollution
Administration of Environmental Protection
Wastewater Treatment
Environmental Microbiology
Pollutant Transportation
Hazardous Wastes
Biogeochemistry
Systems Safety Engineering

Forestry and Related Disciplines

Forest Genetics
Computer Cartography/GIS
Soil Morphology, Chemistry, and Microbiology
Forest Tree Improvement
International Forestry
Wildlife Management

History and Philosophy

World Environmental History

Law

Land Use Law
Judicial Administration Policy

International Business Transactions

Resource Law and Policy
Environmental Law
Wildlife Law

Mathematics, Statistics

Linear Models
Multivariate Statistics
Computer Numerical Analysis
Artificial Intelligence
Linear Algebra and Digital Computation
Bayesian Inference and Decision
Stochastic Methods
Probability and Statistical Inference

Planning

Planning Law
Planning Problems
Environmental Systems Analysis
Regional Land Planning
Water Resource Planning
Dispute Resolution

Political Science, Public Policy

Microeconomics and Policy Making
Analytical Methods
Comparative International Development
Politics and Policy Processes
International Environmental Policy

Public and Environmental Health

Microbiology
Environmental Virology
Epidemiological Principles
Radiation Biology
Air and Industrial Hygiene
Aerosol Science

Toxicology

Mammalian Toxicology
Pharmacology and Toxicology
Biochemical Toxicology
Biochemistry
Neurotoxicology
Principles of Immunology

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1995-96

The Fuqua School of Business



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The Fuqua School of Business

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The information in this bulletin applies to the academic year 1995-96 and is accurate and current, to the extent possible, as of August 1994. The university reserves the right to change programs of study, academic requirements, teaching staff, the calendar, and other matters described herein without prior notice, in accordance with established procedures.

Information that the university is required to make available under the Student Right to Know and Campus Security Acts may be obtained from the Office of University Relations at (919) 684-2823 or in writing to 615 Chapel Drive, Duke University, Durham, North Carolina 27708.

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University Administration

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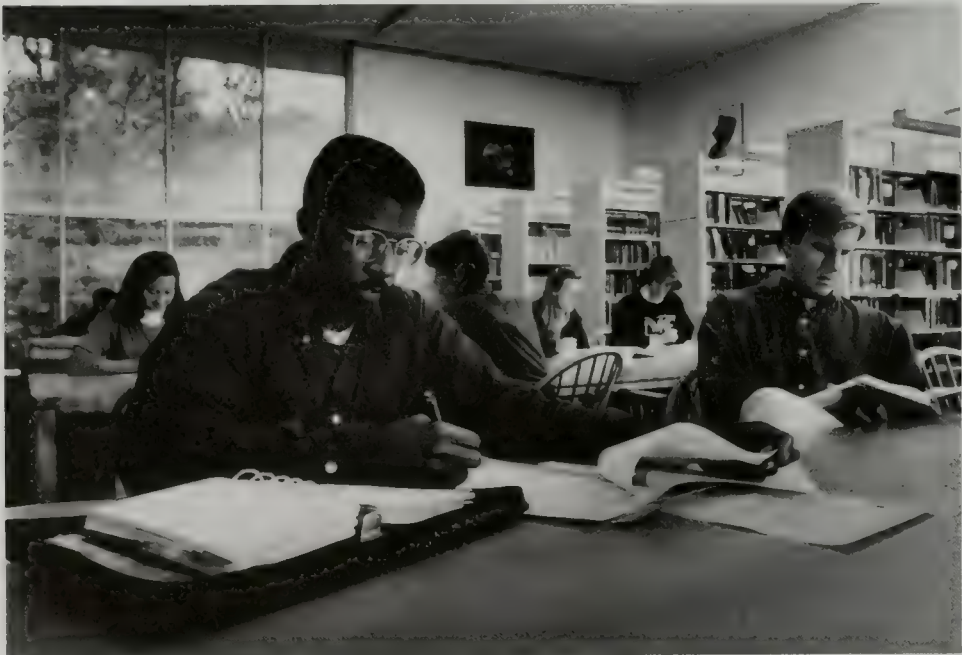
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THE FUQUA SCHOOL OF BUSINESS CALENDAR*

MBA Academic Calendar

Fall 1995

August	
22-23	Exemption Exams for MBA Class of 1996
23-25	Orientation and Registration
27-Sept. 1	Integrated Learning Experiences 1 & 3
September	
4	Labor Day, Term 1 classes begin
27	All Sept. 28 MBA classes move to Sept. 27
28	All Sept. 29 MBA classes move to Sept. 28
29	Job Fair, NO MBA CLASSES
October	
13	Term 1 ends
17-20	Term 1 exams
23-24	FALL BREAK
26	Term 2 classes begin
November	
22-24	THANKSGIVING BREAK
December	
8	Term 2 ends
12-15	Term 2 exams

Spring 1996

January	
15	Term 1 classes begin
February	
23	Term 1 ends
27-Mar. 1	Term 1 exams
March	
4-8	SPRING BREAK
11-15	Integrated Learning Experiences 2 & 4
18	Term 2 classes begin
April	
26	Term 2 ends
30-May 3	Term 2 exams
May	
11-12	Commencement

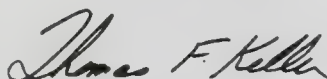
* Dates of the 1995-96 calendar are subject to change by the provost of Duke University during the 1994-95 year.

A Message from the Dean

In his indenture establishing Duke University, James Buchanan Duke called for, among many other components of a research university, a school of business administration. The Board of Trustees of Duke University, in 1969, established the Graduate School of Business Administration with a mandate to provide programs in management education of the highest quality. In 1980 the school was renamed to honor J. B. Fuqua of Atlanta, Georgia, who is an emeritus member of the University's Board of Trustees and an active member of the Fuqua School's Board of Visitors. Mr. Fuqua continues to support the school through his generosity and his participation in its programs.

The mission of the Fuqua School of Business is to provide the highest quality education for business and academic leaders, and promote the advancement of the understanding and practice of management through research. Our approach is to prepare men and women to meet their career opportunities with a strong education which balances generalist and functional skills, as well as with an awareness of the need to balance individual leadership and a sense of team. We seek students who possess high academic standards and demonstrate the ability to think creatively. These are important qualities for business leadership and are reflected in the orientation of our entire program. As a school, we are committed to retaining our flexibility and our responsiveness to management needs as they arise in the business community.

Our heritage at Duke is a tradition of excellence in education. At the Fuqua School we have built on this heritage to develop programs that enable graduates to meet the challenges of leadership in business, government, and educational organizations.

A handwritten signature in dark ink, reading "Thomas F. Keller". The signature is fluid and cursive, with the first name "Thomas" being more prominent and the last name "Keller" following in a similar style.

Thomas F. Keller
Dean

General Information



Duke University

In 1839 a group of citizens from Randolph and adjacent counties in North Carolina assembled in a log schoolhouse to organize support for a local academy founded a few months earlier by Brantley York. Prompted, they said, by “no small share of philanthropy and patriotism,” they espoused their belief that “ignorance and error are the banes not only of religious but also civil society which rear up an almost impregnable wall between man and happiness.” Union Institute, which they then founded, was reorganized first in 1851 as Normal College to train teachers, and eight years later as Trinity College, a liberal arts college, which later moved to the growing city of Durham, North Carolina. With the establishment of the James B. Duke Indenture of Trust in 1924, Trinity College became Duke University.

Today, Duke is a two-campus institution with a student body of about 9,000, of whom 3,000 are enrolled in the graduate and professional programs. Established in 1969, the Graduate School of Business Administration joined the Schools of Medicine, Nursing, Law, Engineering, Divinity, and Forestry in preparing qualified individuals for professional leadership and developing excellence in education for the professions.

The Campus. The main campus (West) of Duke University is a beautifully designed complex of buildings in Gothic architecture, bordered on the east by the Sarah P. Duke Gardens and on the west by the 8,000-acre Duke Forest. This campus is dominated by the Duke Chapel, whose 210-foot-high tower houses a 50-bell carillon. The William R. Perkins Library is one of the largest research libraries in the country. The facility for the Fuqua School of Business is located on West Campus near the intersection of Science Drive and Towerview Drive. The East Campus is a smaller complex of Georgian-style buildings and has, as major points of interest, the Duke University Museum of Art and the Mary Duke Biddle Music Building.

Durham is a part of the Research Triangle, an area formed by Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University at Raleigh. The Research Triangle Park, a 5,400-acre campus for research laboratories, governmental agencies, and research-oriented industries, is recognized as one of the world’s leading science centers. Durham, located near the center of the state, has easy access to the Great Smokies of the Appalachian Mountains and to the scenic and historic beaches of the Outer Banks. The area offers varied cultural and recreational activities ranging from concerts, opera, dance, theater, and recitals to intramural and collegiate sports, boating, skiing, camping, and other outdoor activities.

The Fuqua School of Business. Recognizing the importance of business education, Duke University’s Board of Trustees established the Graduate School of Business in 1969,

with the mandate to provide management education programs of the highest quality. The school began with two programs; an undergraduate major in management science, which now no longer exists, and a fledgling M.B.A. Program that graduated its first class of twelve students in 1972. Since that time, the school has grown to include five major academic programs, a faculty of eighty-eight, and over 800 masters degree candidates enrolled in daytime and executive M.B.A. programs. The school also offers a wide range of nondegree executive education programs and seminars.

J. B. Fuqua, chairman, The Fuqua Companies, Atlanta, Georgia, has supported the school generously in its development. In honor of Mr. Fuqua's contribution to the school and personal participation in its growth, the school was renamed the Fuqua School of Business in 1980 by proclamation of the Board of Trustees.

In January of 1983, the Fuqua School of Business moved into its present building on Science Drive on Duke University's West Campus. This building, designed by Edward Larrabee Barnes, offers one of the finest settings for management education in the United States. The 140,000 square feet of space provides for the instruction of M.B.A. students in a variety of degree programs.

The building is constructed in two wings. One wing, primarily designed for M.B.A. education, includes six amphitheater-style classrooms, the 500-seat Harold S. Geneen Auditorium, a library completely devoted to management education, and numerous seminar and breakout rooms.

In May of 1989 the Fuqua School opened the 103,000 square foot R. David Thomas Center. Named after the founder of Wendy's International, Inc., the center has 111 guest rooms, three classrooms, a 250-seat dining room, and a 110-seat clubroom. The center was designed to be a comfortable and efficient facility to serve the Fuqua School's Executive Education and Executive M.B.A. students. The R. David Thomas Center is connected to the main Fuqua School building by a covered walkway.

Resources of the University

The Library System. The libraries of the University consist of the Perkins Library system and three professional school libraries: the Fuqua School of Business Library, the Law Library and the Medical Center Library. The Perkins Library system includes the main library of the university, the William R. Perkins Library, and nine branches: Biology-Forestry, Chemistry, Divinity, the Lilly Library, Engineering, Music, Math-Physics, the Undergraduate Library, and the Pearce Memorial Library at the Duke Marine Laboratory in Beaufort. As of June 1990, Duke libraries contained approximately 4,000,000 volumes and ranked nineteenth in size among academic libraries in the United States. More than 30,000 serials, and 220 newspapers are received regularly. The collection includes more than 9,000,000 manuscripts, 110,000 maps, and 1,280,000 microforms.

The William R. Perkins Library. The William R. Perkins Library—the main library of the university—houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The manuscript collection of approximately nine million items is particularly strong in all phases of life in the South Atlantic region. It also includes significant papers in English and American literature. The rare books collection contains materials covering a broad range of fields, and the Latin and Greek manuscripts constitute one of the outstanding collections in the United States. The collection of Confederate imprints is the largest in the country.

Tours of the Perkins Library are given frequently during orientation week and upon request throughout the year. Handbooks about library services and facilities are also available in each of the libraries.

The Fuqua School of Business Library. The Fuqua library houses the principal business collections for the university, and includes books, journals, reports, videotapes, working papers, and data bases in accounting, entrepreneurship, finance, human resources management, industry studies, information science, international business, managerial economics, marketing, organizational behavior, and operations management. The library's collections are tailored to the needs of the students and faculty of the Fuqua School and recent acquisitions include important business issues in the curriculum, such as diversity, business in the environment, global business management, health services management and total quality management. As of June 1994, the library houses 20,000 volumes of books, 800 current periodical subscriptions, 330,000 microforms, and a comprehensive business reference collection. The library also houses several special collections, including annual and 10K reports on microfiche, computer software, and career services materials. In addition, faculty and students also access more than a dozen databases in the library's database room. These databases include ABI/Inform; Business Periodicals on Disc; CD/Corporate; Datastream; Dialog; Dun and Bradstreet's Middle Market Directory; Dun and Bradstreet's Million Dollar Directory; General Business File; Lexis-Nexis; Morningstar; NTDB; *New York Times* Full-Text; the *Wall Street Journal* Full-Text; *Washington Post* Full-Text; and Worldscope. These databases contain information on companies, industries, and other topics of interest to business students and faculty.

Fuqua librarians search all major computerized databases, such as Dow-Jones News/Retrieval and over 200 databases on the Dialog and Lexis-Nexis systems, which cover the spectrum of business research. The library's on-line catalog locates books in all Duke libraries, as well as in the libraries at neighboring universities. In addition, the library has on-line access to other computer systems that locate books and journals in other libraries, and obtains these materials on loan for Fuqua faculty and students.

Library services also include a journal contents alerting service for faculty and library instruction for faculty and students. To assist M.B.A. students, librarians staff the reference desk Sunday through Friday, during the fall and spring terms.

During orientation week, tours that cover the library's collections and services are offered to students. Information about the Fuqua Library may also be obtained from library staff. In addition, brochures and bibliographies describing the library's collections and services are available at the circulation desk.

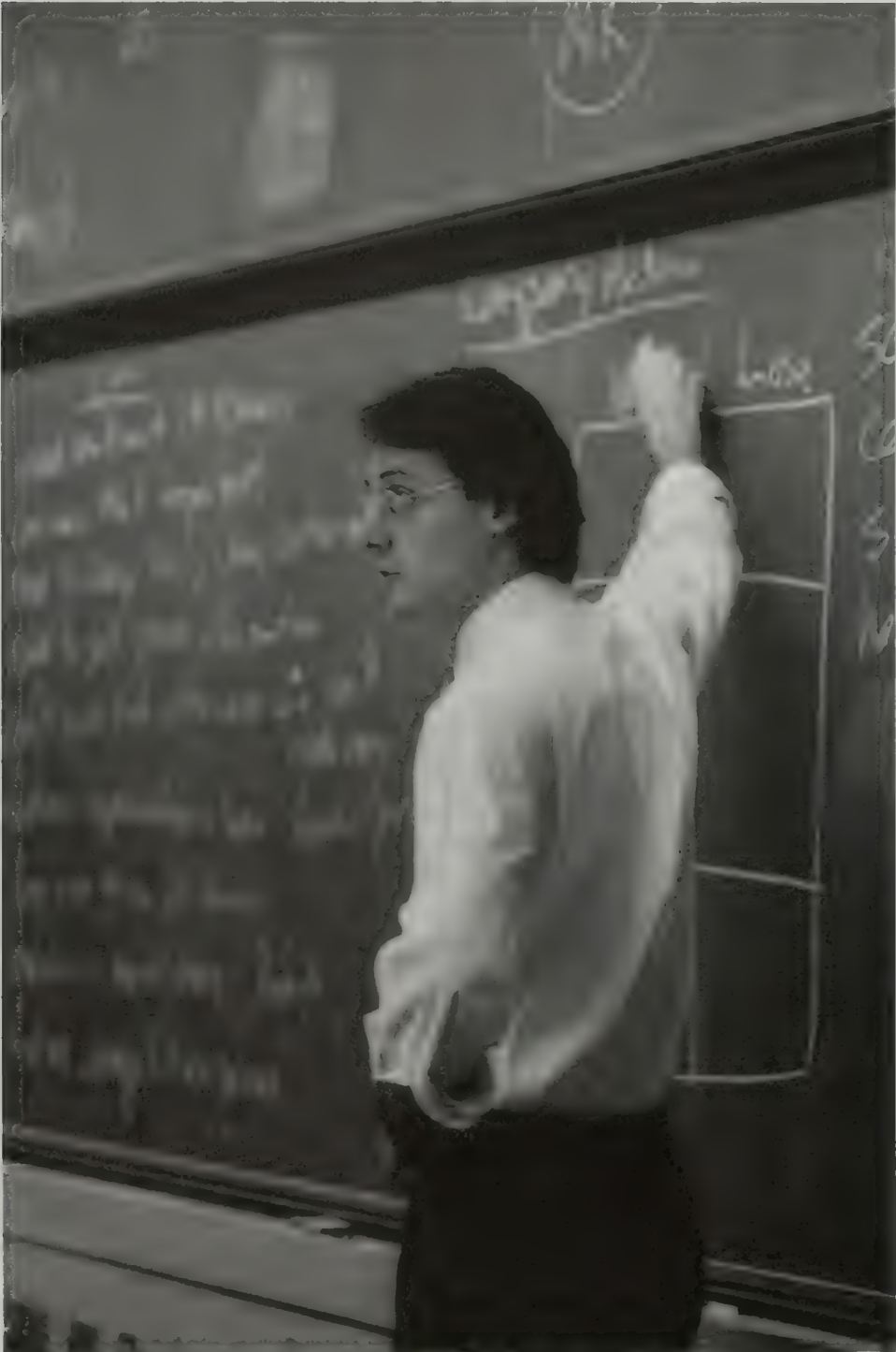
Computing Resources. The Fuqua School's Computer Center manages all instructional, research, and administrative computing in the school. For student use, the center maintains two microcomputer laboratories. One contains 40 PCs and the other contains 19 PCs. Additional PCs are located in team study rooms. The majority of PCs are connected to shared laser printers. All PCs in the labs and team rooms are NCR 486 PCs connected by local area networks over which the center distributes a wide variety of software.

The Computer Center maintains an IBM 4381 mainframe computer for faculty research computing, elective M.B.A. coursework, and administrative data processing. A variety of mainframe software systems for communications, database management, statistical analysis, high level language programming are available on the IBM 4381 for large scale business computing.

All PCs in offices and classrooms in the Fuqua building and all student-use PCs are interconnected through a network based on the IBM 4381 and an AT&T ISN. Each of the school's classrooms and auditoria are equipped with a PC capable of projecting both mainframe and PC network applications.

Overall, the Fuqua School's computing facilities provide an impressive wealth of resources to the school. More importantly, the nationally recognized Computer Center fosters a dynamic computing environment characterized by ongoing efforts to expand and improve the computing resources available to students and faculty.

Programs of Study



The Master of Business Administration Programs

The M.B.A. Program at the Fuqua School of Business prepares individuals for challenging management careers. The program emphasizes the understanding and application of analytical tools and concepts drawn from a broad array of management fields of inquiry. Students are asked to structure unstructured situations and to propose solutions to complex problems. By studying analytical tools, theories, and examples, students learn to identify the common threads in seemingly different business situations and to grasp the essential nature of unfamiliar management problems.

The faculty uses a variety of teaching styles. In some courses, lectures are used. In others, the case method predominates. In still others, there is a mix of many styles, including role playing and student presentations. Depending on the course, the work done outside of class is likely to consist of (1) reading texts or articles, (2) working problem sets, (3) researching and writing papers, or (4) preparing cases and discussing them in small study groups.

The school has made a deep commitment to the use of the personal computer in business education. Students are required to master word processing, spread-sheet programs, and some statistical packages on microcomputers. A number of courses require the use of these rapidly developing managerial skills. Likewise, the school is also committed to improving the communication skills of its students. The business communication curriculum does not stand by itself, but has been carefully integrated into other course work.

In academic year 1992-93, the Fuqua School launched a radically altered curriculum. This was done in response to nearly a decade of serious questioning of American graduate management education. Prior to designing this new curriculum the school spent a year in close consultation with its partners (corporations, alumni, students, and faculty) to determine what a modern graduate program should contain. To date this new curriculum has been a huge success, placing the Fuqua School squarely in a leadership position in graduate management education. The Fuqua curriculum is described in detail in the section below.

The Fuqua School of Business is accredited by the American Assembly of Collegiate Schools of Business and is a member of the Graduate Management Admission Council.

OUTLINE OF THE CURRICULUM

The M.B.A. degree requires four semesters, divided into a total of eight terms, of full-time academic work totaling at least 85 units of graduate course credit. Students who are proficient in a particular subject may be allowed to substitute advanced course work for one or more core courses. There are no summer sessions for students in the M.B.A. program.

Modern management often requires analytical reasoning which focuses on precise statements of relationships between variables. In contemplating the future, concepts of

probability become especially important. For these and other reasons much of the course work assumes a firm grasp of mathematical concepts. Applicants are strongly encouraged to come prepared with the necessary background. A working knowledge of calculus is essential. Evidence of this preparation is required for admission.

Integrative Learning Experiences. Each semester begins with a required Integrative Learning Experience. The Integrative Learning Experiences (ILEs) are designed to address areas of the curriculum that are difficult to present in a traditional classroom setting and are better addressed via nontraditional and multiple formats. The four ILEs are organized to reflect the stages of a student's development as he or she progresses through the program. The first ILE creates a sense of community among the students that is vital to the teamwork required by later course assignments. After students have taken two terms of classes, the second ILE provides a format for examining competitive business strategy. As students begin the second year, they engage in the third ILE in which they integrate all of the material from their first-year coursework. While students prepare to rejoin the business world, they examine an actual complex management issue in the fourth ILE that has the potential to shape the course of business over the next decade. This ILE requires them to review the strategic issues confronting all functions of the firm. The Integrative Learning Experiences form one of the most exciting and innovative components of the Fuqua School's curriculum.

THE FIRST YEAR

Course work in the first year is designed to provide the basic knowledge and tools of analysis for the operation of business organizations and to introduce the student to the functional areas of the firm. The first-year program includes:

TYPICAL FIRST-YEAR SCHEDULE

Semester 1

BA 401. ILE: Team Building and Leadership Development

Term 1

- BA 300. Managerial Economics
- BA 311. Probability and Statistics
- BA 320. Managerial Effectiveness
- BA 381. Individual Effectiveness

Term 2

- BA 301. Economic Environment of the Firm
- BA 312. Decision Models
- BA 330. Financial Accounting
- BA 382. Individual Effectiveness

Semester 2

BA 402. ILE: Competitive Business Strategy

Term 3

- BA 350. Financial Management
- BA 360. Marketing Management
- BA 370. Operations Management
- BA 383. Individual Effectiveness

Term 4

- BA 331. Managerial Accounting
- Elective
- Elective
- BA 384. Individual Effectiveness

THE SECOND YEAR

During the second year of the program, students may choose from a wide variety of electives. The school does not require formal concentrations, so students are free to choose electives either focusing on a particular functional area or develop a program that emphasizes breadth of general management skills. The program's flexibility allows students to tailor the curriculum to meet their individual educational and career goals.

Within the elective offerings each Fuqua student must choose a minimum of two courses from a set which are identified as being international in character. This provides Fuqua students with the perspective to work effectively in today's global business environment.

Students may take either eleven or twelve electives during the second year. The typical course load in the second year is three courses per term; however, students may elect to take one less elective during one term of the second year to accommodate the heavy recruiting schedules which are part of the job search. Combining these second-year electives with the two electives taken in the first year, the program offers a total of thirteen or fourteen elective courses.

Also attractive to second-year students is the opportunity to take up to four courses in other schools or departments at Duke University, such as the School of Law, the School of the Environment, the Institute of Policy Sciences and Public Affairs, and the Department of Economics of the Graduate School. With approval, two of the four outside courses may be at the undergraduate level, for example, an undergraduate foreign language course.

TYPICAL SECOND-YEAR SCHEDULE

Semester 3

BA 403. ILE: Competitive Advantage through People and Processes

Term 5

Elective
Elective
Elective

Term 6

Elective
Elective
Elective

Semester 4

BA 404. ILE: Complex Management Problems

Term 7

Elective
Elective
(Elective)

Term 8

Elective
Elective
Elective

M.B.A. with an Accounting Concentration

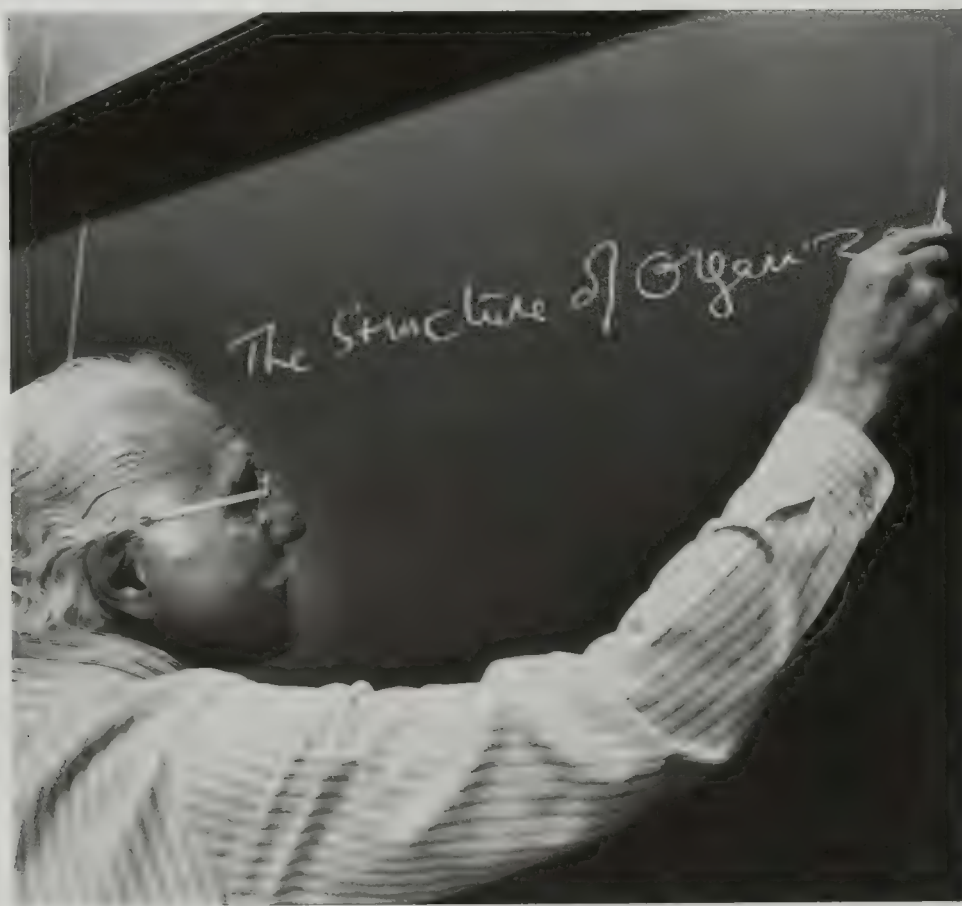
Thanks to extensive financial support from the major public accounting firms, the Fuqua School of Business offers an M.B.A. degree with a concentration in accounting. Although Fuqua School students are not required to designate a major as part of the completion of the M.B.A. degree, those interested in professional careers in accounting may choose to concentrate in this area. Students who elect to pursue the concentration

in accounting usually do so with the intent of entering the accounting profession and taking the CPA exam immediately after the completion of their degree. Certified Public Accountants are licensed by individual states, all of which use the Uniform CPA Examination. This entry level examination necessitates that students take a specified curriculum in order to be adequately prepared. Additional course requirements may be imposed by specified states for licensing in addition to those courses in the accounting concentration. Students enrolling in the program should determine the particular licensing requirements of the individual states in which they are interested in residing.

M.B.A. with a Health Services Management Concentration

The Health Services Management concentration provides students with the opportunity to develop particular skills and knowledge about the management of health organizations, including hospitals. M.B.A. students who intend to enter or have a strong interest in health care management are invited to pursue the M.B.A. with a health services management concentration.

In the first year, the M.B.A./H.S.M. student takes the M.B.A. core curriculum. In addition, a seminar on health services management is given. The seminar involves discussions with numerous health care managers and examines current health care issues. Between the first and second years, the M.B.A./H.S.M. students may do an internship in a health services organization. In the second year, the M.B.A./H.S.M. students are required to take courses in health care policy, managing the professional



service organization, and the strategic management for health sciences. In addition, two of the following electives are required: Human Resource Management, Operations Management in the Service Sector, Marketing of Services, Quality Control, or Accounting for Service Organizations. M.B.A./H.S.M. students have the opportunity to take numerous nonspecified electives as well. Also, M.B.A./H.S.M. students take a second-year health services management seminar.

The M.B.A./H.S.M. graduate is especially prepared to pursue a managerial career in health management in hospitals, health care systems, and a number of health care related industries. To obtain the H.S.M. concentration designation, students must complete all course requirements outlined above and successfully complete two of the following: first-year health care management seminar, the summer internship, and one second-year health care management seminar. The concentration is accredited by the Accrediting Commission on Education for Health Services Administration.

The Doctor of Philosophy Program

The Ph.D. in Business Administration Program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results. Students are introduced at the outset of the program not only to rigorous course work, but also to the research activities of the faculty and of other students. (A ratio of doctoral students-in-residence to faculty of less than one to one facilitates this opportunity to work closely with faculty.)

The program requires that doctoral candidates must acquire expertise in their chosen area of study and in research methodology. This competence may be gained from course work, participation in seminars, and independent study. Each student takes a comprehensive exam at the end of the second year or the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires four to five years of work. The student and his/her faculty committee determine the specific program of study.

Special Programs

CONCURRENT DEGREE PROGRAMS

The Fuqua School of Business offers combined degree programs with the School of Law, the School of the Environment, the Institute of Policy Sciences and Public Affairs, and the School of Engineering, all at Duke University. By recognizing certain areas of study common to the M.B.A. and each of the other advanced degrees, duplication of instruction is eliminated and students are able to obtain the concurrent degrees in less time than would normally be required to obtain the two degrees separately. Students are normally required to take 51 units of business administration course work following admission to a concurrent degree program.

The M.B.A.-J.D. The concurrent M.B.A.-J.D. program requires four academic years of study with a full year in each school and two years of combined study that meets the requirements for both the M.B.A. and J.D. degrees. Students must apply for admission and be accepted by both the School of Law and the Fuqua School of Business. Additional information on the program may be obtained from the Director of Admissions, the Fuqua School of Business, Duke University, and the Admissions Office, Duke University School of Law.

The M.B.A.-M.F. and the M.B.A.-M.E.M. The concurrent M.B.A. and Master of Forestry or Master of Environmental Management degrees normally require three years of study. Students must apply for admission and be accepted by both the School of the

Environment and the Fuqua School of Business. Additional information on the program may be obtained from the director of admissions, the Fuqua School of Business, Duke University, and the Director of Admissions, Duke University School of the Environment.

The M.B.A.-A.M. in Public Policy Sciences. The concurrent M.B.A. degree and Master of Arts degree in Public Policy Sciences normally requires two and a half to three years of study. The joint degree curriculum requires a minimum of thirty credits to be specified by the Institute of Policy Sciences and Public Affairs, and sixty-seven credits to be specified by the Fuqua School of Business. Students must apply to and be accepted by both the Fuqua School of Business of Duke University and the Graduate School of Duke University. Additional information may be obtained from the director of admissions, the Fuqua School of Business, Duke University, and the director of graduate studies, Institute of Policy Sciences and Public Affairs.

Public Policy Option. For those students interested in management careers in the public or not-for-profit sectors the Fuqua School of Business offers a public policy option. This option consists of a recommended set of M.B.A. elective courses to be taken in the Institute of Policy Sciences and Public Affairs. Students interested in pursuing this option must obtain the consent of the institute's faculty adviser of M.B.A. students and the consent of the M.B.A. program director.

The M.B.A.-M.S. in Engineering. The objective of the M.B.A.-M.S. in Engineering is to enable qualified students to acquire the expertise needed to assume leadership roles in the development and management of the complex technological and societal systems of the future. The program takes five semesters and, in most cases, an undergraduate degree in engineering is needed. Additional information about the Duke University School of Engineering and this program may be obtained by writing the Director, M.B.A.-M.S. Program, School of Engineering, Duke University, Durham, North Carolina 27706.

COMBINED UNDERGRADUATE-PROFESSIONAL DEGREES

Also known as the "three-two" program, the combined undergraduate-professional degree program provides that the Bachelor of Science or Bachelor of Arts degree may be awarded to students who successfully complete three years in an approved curriculum in arts and sciences or engineering at Duke and also the first year of study for the Master of Business Administration. After two years at Duke and before transfer to the Fuqua School of Business, students may apply for the three-two program through their academic dean. To be eligible for the combined program a student must successfully complete all baccalaureate requirements (except eight elective courses) and be admitted to the business school. Upon satisfactory completion of the first two semesters in the Fuqua School of Business, the student will be awarded a baccalaureate degree. The M.B.A. degree is awarded upon completion of the second year of the program.

WEEKEND EXECUTIVE M.B.A. PROGRAM

The Fuqua School of Business offers a Weekend Executive M.B.A. Program for fully-employed business executives who wish to complete an M.B.A. degree without career interruption. It offers mid- to high-level managers a general management education, and includes the tools, concepts, and strategies required for senior leadership.

Beginning in January 1995, Fuqua also offers a WEMBA program in Health Services Management (HSM). Participants in this program will be fully integrated into the General Management Program, but then will be able to take a number of courses specifically geared to their needs. Graduates will earn an M.B.A. as well as a certificate in HSM.

The Weekend Executive M.B.A. Program meets Friday-Saturday every other weekend. Applicants must have a minimum of five years of professional experience, be in a managerial position, and have corporate support. The program requires twenty months

of study and includes five semesters of course work. Students interested in the program should contact the Director of Executive M.B.A. Programs or the Director of Admissions, Fuqua School of Business, Duke University.

EXECUTIVE EDUCATION

In addition to traditional M.B.A. degree programs, the Fuqua School offers an extensive array of nondegree executive education programs based on the recognition that education is a life-long process requiring continual renewal. Now serving approximately 2,000 executives a year, the 11 different types of open enrollment and over 41 tailored, company-specific programs, totalling over 87 program weeks, allow for business leaders worldwide to benefit from the quality of education that the Fuqua School offers. The interaction of faculty, administrators, and participants gives executives the opportunity to learn from the best in both academic and corporate sectors, while keeping the Fuqua School in touch with the present day concerns of business leaders.

One of the strongest symbols of the Fuqua School's commitment to executive education is the R. David Thomas Center. The Thomas Center is set into a wooded hillside at the western edge of the Duke campus. The secluded location together with the design of the buildings create an ideal environment for learning. The 103,000 square-foot facility features two 55-seat state-of-the-art classrooms, a 25-seat seminar room, two 20-seat boardrooms, 15 breakout rooms, full dining facilities, fitness center, and 111 sleeping rooms.

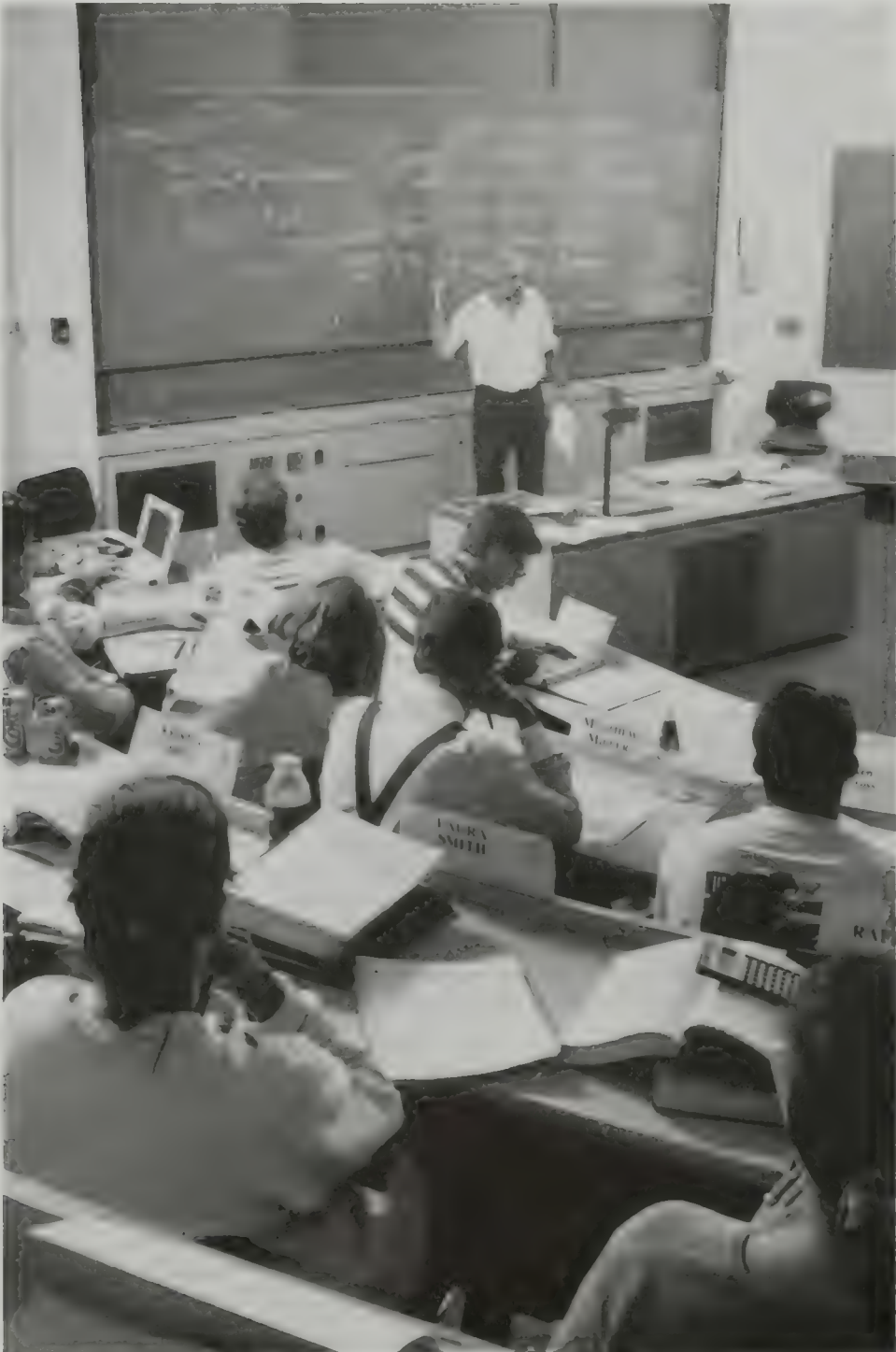
Among the major programs offered are the six-week Global Executive Program, conducting sessions in Asia, Europe, and the United States. The four-week Advanced Management Program and the two-week Program for Manager Development are both offered three times each year. In addition to these superior general management courses, several one-week functional and specialty programs are offered, such as: Becoming Customer Driven; Basic Financial Strategies for Decision Makers; Global Finance Management; Emerging Markets Management; Building Strategic Relationships; and Competing in Telecommunications.

Additionally, two programs have been designed specifically for managers from the former Soviet Union or new independent states. One is offered in St. Petersburg, Russia, and the other here in Durham, NC.

Our worldwide recognition has been achieved through our tailored or custom designed programs, which are developed and delivered specifically for individual firms, meeting their precise development needs. Companies such as AT&T, Bethlehem Steel, Eli Lilly and Co., Ernst & Young, Ford Motor Co., Harnischfeger Industries, ITT, Johnson & Johnson Companies, and Lafarge Corporation have gained strategic corporate advantage through participation in the executive education custom programs at Fuqua.

Further information may be obtained by contacting Dr. Blair H. Sheppard, Associate Dean and Director of Executive Education, the Fuqua School of Business, Duke University, R. David Thomas Center, Box 90116, Durham, NC 27708-0116, telephone number 800 FSB-EXEC, or (919) 660-8011.

Admissions



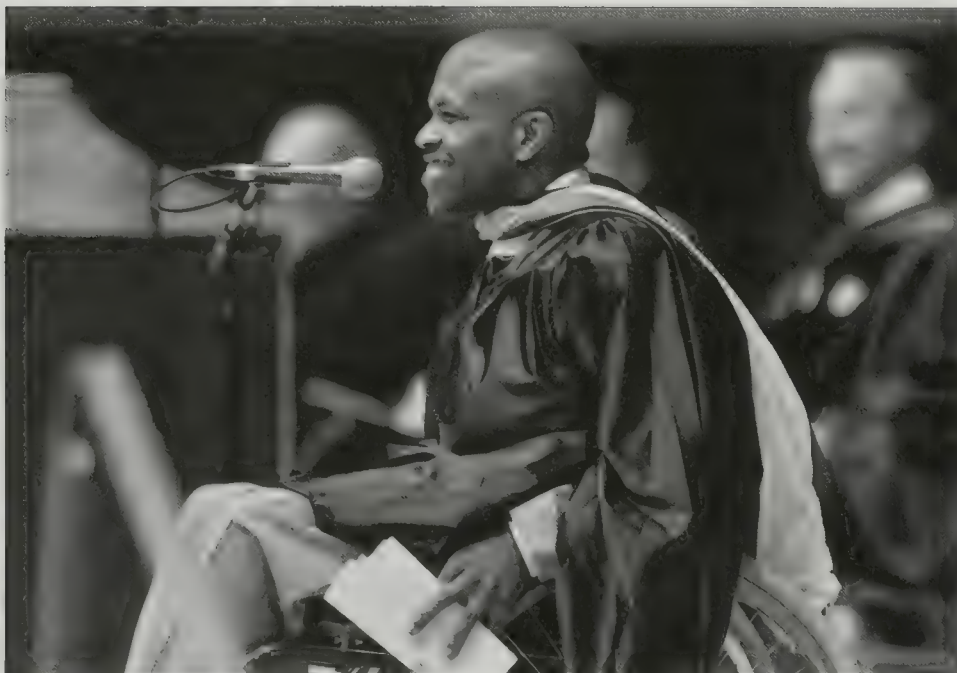
Admissions

Anyone who holds a bachelor's degree from an accredited college or university, but does not already hold an M.B.A. degree, is eligible to apply for admission to the Fuqua School of Business. No specific undergraduate major is deemed preferable to any other; however, the programs are designed primarily for persons with training in the liberal arts, engineering, or the sciences. The Admissions Committee seeks those candidates with leadership potential who are prepared to compete successfully in a demanding course of study which requires logical and analytical reasoning. All entering students are expected to have a working knowledge of calculus, and applications are reviewed closely for this ability. Matriculants to the M.B.A. Program are expected to sign and abide by the Honor Code agreed upon by the students and faculty of the Fuqua School of Business.

The Admissions Committee considers full-time business or military experience to be a definite asset in the admissions process. Consequently, 98 percent of the most recent M.B.A. class entered Fuqua with full-time work experience.

Application Information. Complete instructions for filing an application are included with each application packet. Each applicant must submit the following to the Admissions Office before action can be taken:

1. **Application Form:** Careful completion of the application will ensure a thorough evaluation. Since it is desirable that the application be as complete as possible, additional sheets should be used if necessary.
2. **College Transcripts:** An official transcript from each of the colleges *attended* must be sent to the Admissions Office. Students who apply during their senior year must ensure that a final transcript be received by the business school prior to enrolling.
3. **Letters of Recommendation:** Three letters of recommendation are required and must be sent to the Admissions Office. Recent graduates or those in their senior year should have at least one letter submitted from persons familiar with their academic ability. Recommendations should be professional or academic, not personal.



4. Graduate Management Admission Test: Score reports must be sent directly from the Educational Testing Service to the Fuqua School of Business.
5. Application Fee: A nonrefundable fee of \$75 to cover processing must be submitted with the application.

Any questions or requests for application materials should be addressed to the Director of Admissions, The Fuqua School of Business, Duke University, Box 90104, Durham, North Carolina 27708-0104, telephone (919) 660-7705.

The Fuqua School uses a rolling decision process and applicants are encouraged to complete their applications as early as possible. In general, the processing and review time for completed applications is six to eight weeks. Those received after the final April 3 deadline will be considered on a space-available basis. Applications will be reviewed and candidates notified according to the following schedule:

Completed application received:

December 1, 1994
January 16, 1995
February 13, 1995
April 3, 1995

Decision mailed by:

January 31, 1995
March 16, 1995
April 13, 1995
May 31, 1995

Notification of Status. When the applicant has been accepted, a letter of admission and an acceptance form will be sent. A nonrefundable tuition deposit of \$500 will be required to reserve a place in the class. The process of admission is not complete until the statement of acceptance and the tuition deposit have been returned to the Director of Admissions.

Applicants notified of acceptance prior to March 15 will be expected to make the \$500 tuition deposit by April 15. Applicants notified of acceptance after that date will be expected to make the tuition deposit within three weeks of the notification, or the place

in the entering class will be forfeited. It should be reiterated that the tuition deposit is in all cases nonrefundable.

Graduate Management Admission Test. The Graduate Management Admission Test, required of all applicants, is administered by the Educational Testing Service. Detailed information about the test and application forms may be obtained by writing directly to the Graduate Management Admission Test, Educational Testing Service, Box 6103, Princeton, New Jersey 08541-6103.

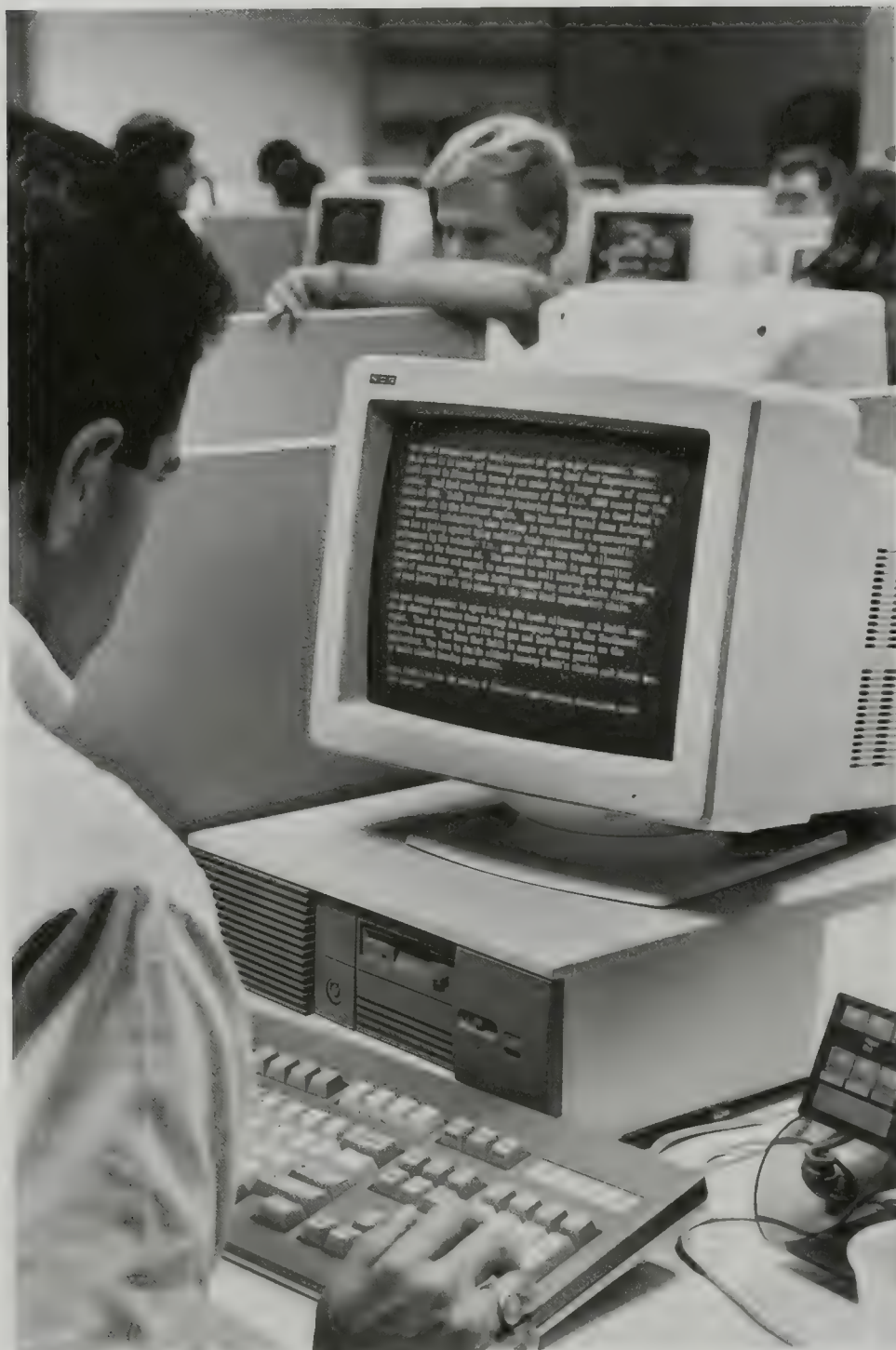
The examination is administered at many centers throughout the United States and abroad. Arrangements to take the test at an established center must be made four weeks before the test date (six weeks prior to test date at established foreign centers). The examination is given four times a year. Special centers may be arranged for persons distant from established centers. Requests for such accommodations must be made at least eight weeks prior to the selected test date. Applicants are encouraged to take the test in October or January; those taking the test in March or June run the risk of having the class already filled by the time scores are available.

Admission of International Students. Fully qualified students from outside the United States are welcome at the Fuqua School of Business. In applying for admission, the foreign student should submit, in addition to the above credentials, the following:

1. If the native language is not English, the results of the Test of English as a Foreign Language (TOEFL) must be submitted. Most successful applicants score approximately 600 or better on the TOEFL.
2. A statement certified by a responsible person that finances are sufficient to maintain the student during the stay at Duke University. Fuqua is pleased to be able to consider international applicants for scholarships. However, scholarship money is limited and will not be sufficient to cover tuition and living expenses. International students are not eligible for federal financial assistance (loans and work-study).

The M.B.A. program is a two-year program and all students are expected to complete the required coursework in the allotted time period. International applicants should be prepared to carry the normal course load as described earlier in the bulletin. For this reason, applicants whose native language is not English should consider the merits of enrolling in the Summer Institute in American Business, Communication, and Culture offered by the Fuqua School. Since the coursework in the program involves lectures, discussions, and group projects, a firm understanding of the language is required.

Financial Information



Tuition and Fees

The tuition for students in the Fuqua School for the year 1994-95 is \$10,400 per semester. All charges are due and payable at the times specified by the university and are subject to change without notice. An \$8 charge will be imposed for any student's check returned to the university unpaid.

After the beginning of classes, refunds will be made on a pro rata basis. Students may elect to have tuition charges refunded or carried forward as a credit for later study according to the following schedule:

1. Withdrawal before classes begin: full refund.
2. Withdrawal during the first or second week of classes: 80 percent.
3. Withdrawal during the third, fourth, or fifth week of classes: 60 percent.
4. Withdrawal during the sixth week: 20 percent.
5. Withdrawal after the sixth week: No refunds.

Tuition or other charges paid from grants or loans will be restored to those funds not refunded or carried forward.

Payment of Accounts. Following first enrollment in the Fuqua School, monthly invoices are sent each student by the bursar's office. As a part of the agreement of admission to Duke University a student is required to pay all invoices as presented. A late payment charge will be assessed for all charges not paid in full by the due date, and certain restrictions may be applied. All students are charged the student health fee and student accident and sickness insurance coverage unless they file properly completed and signed waivers in the bursar's office by the invoice due date.

Late Payment Charge. If the total amount due on the student's invoice is not received by the bursar by the invoice due date, a penalty charge will be accrued from the billing date of the invoice. The late payment charge is assessed at a rate of the 1/3 percent per month (16 percent per annum) applied to the past due balance. The past due balance is defined as the previous balance less any payments and credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default if the total amount due is not paid in full by the due date. A student in default will not be allowed to receive a transcript of academic records, have academic credits certified, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

M.B.A. Association Student Activity Fee. All students are assessed a \$100 nonrefundable fee to be used to support the activities of the M.B.A. Association.

Athletic Tickets. Athletic ticket books are available to graduate students. Purchase is optional, with payment due in the fall semester.

Vehicle Fee. Each student possessing or maintaining a motor vehicle at Duke University shall register it during the week of orientation or at posted times during the beginning of the academic year in the Bryan Center. A student who acquires a motor vehicle and maintains it at Duke University after academic registration must register it within five calendar days after operation on the campus begins. Resident students are required to pay an annual fee for each motor vehicle.

At the time of registration of a motor vehicle the following documents must be presented: state vehicle registration certificate, valid driver's license, and a student identification card.

Student Health Fee. All students are assessed a nonrefundable fee for the Student Health Service. The fee for 1994-95 is \$370 (\$185 per semester).

Student Accident and Sickness Insurance. The university has made arrangements for a Student Accident and Sickness Insurance Plan to cover all full-time students for a twelve-month period. For an additional fee a student may obtain coverage for a spouse and children. Although participation in this program is voluntary, the university requires all graduate students to be financially responsible for medical expenses above those covered by the University Student Health Program through the University Accident and Sickness Policy, a private policy, or personal financial resources. Students who have equivalent medical insurance or wish to accept the financial responsibility for any medical expense may elect not to take the Duke plan by signing a statement to this effect. *Each full-time student in residence must purchase this student health insurance or indicate the alternative arrangement.* The Student Accident and Sickness Insurance Policy provides protection twenty-four hours per day during the full twelve-month term (August 17-August 17) of the policy for each student insured. Students are covered on and off campus, at home, while traveling between home and school, and during interim vacation periods. Coverage, services, and costs are subject to change each year as deemed necessary by the university. The rates for 1994-95 are estimated at: student only—\$618 per year; and family plan (student, spouse, and children)—\$1,942 per year. For information regarding coverage call (919) 684-6455.

Living Expenses. The estimated student living costs for the 1993-94 academic year are approximately \$9,300 for ten months. These estimates include allowance for room and board, transportation, and miscellaneous personal expenses.

Debts. No records are released until students have settled with the bursar for all indebtedness. Failure to pay all university charges on or before the times specified by the university will bar the student from class attendance until the account is settled in full.

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the university.

Financial Aid

The Fuqua School of Business endeavors to make it possible for qualified students to attend Duke even though their own resources may be insufficient. Financial aid is available in the form of fellowships and through various loan programs.

SCHOLARSHIPS AND FELLOWSHIPS

Each year a number of merit-based fellowships are available to incoming students. The criteria for selection are prior academic achievement, demonstrated qualities of leadership, involvement in extracurricular activities and professional accomplishments. The awards are for two years of graduate study, ranging from partial tuition to full tuition. Requests for fellowships should be filed early in order to receive full consideration. Funding is limited and is awarded as applicants are admitted to the program. Students who enroll without a fellowship or scholarship award should not anticipate an award in their second year.



NAMED SCHOLARSHIPS AND FELLOWSHIPS

First-Year Awards

Listed below are the named awards for first-year students who have already been awarded a Fuqua fellowship. Selection of recipients is made during the summer and no special application is required. The award replaces, but would not be less than, funds that have already been offered and do not provide additional scholarship aid to the recipient.

A. F. Calabrese Scholarships. John J. Mack, A.B. 1968, and a member of the school's Board of Visitors, established this endowed fund to honor A. F. Calabrese. The fund provides scholarships for students enrolled in the Fuqua School who participated in intercollegiate athletics. Preference is given to students who attended Duke or the Catholic University of America.

Allied-Signal Fellowships. These fellowships were established by Allied-Signal Foundation Inc. in order to provide support for outstanding students at the Fuqua School. The fellowships may be awarded to either first- or second-year students.

CIGNA Fellowship. Established by the CIGNA Corporation, this fellowship is awarded biennially to a qualified minority student. The fellowship is a two-year commitment of \$2,500 per year for the student chosen.

First Chicago Minority Scholarship. This \$5,000 scholarship is provided by First Chicago to an outstanding minority student. The recipient of this scholarship may be a first- or second-year student.

Robert A. and Annie Lewis Garda Scholarship. Robert A. Garda, B.S.E.E. 1961, chairman of the Fuqua School's Board of Visitors, and his wife Annie Lewis Garda, A.B. 1961, endowed this scholarship to provide major support to one outstanding student during his or her studies at the Fuqua School.

P. Huber Hanes Scholarships. Established in 1939, through the donation of P. Huber Hanes, these scholarships are given annually to Duke students admitted by the Fuqua School into the combined undergraduate-professional degree program.

Junior Achievement Scholarship. A grant from the Little Family Foundation annually supports two awards of \$5,000 each. These scholarships are given to students who have participated actively in a Junior Achievement Company and/or who have worked as an advisor to a Junior Achievement Company. Recipients also must have work experience.

Sara Lee Fellowships. These fellowships provide full-tuition support to three recipients each year. These fellowships are funded by the Sara Lee Foundation which has particular interest in students with operations and marketing backgrounds.

The J. Paul Sticht Endowed Scholarship. Funded by RJR Nabisco Inc., these fellowships were endowed by the R. J. Reynolds Industries in honor of former Reynolds chairman J. Paul Sticht. The fellowship is awarded annually to a graduate of Mr. Sticht's alma mater, Grove City College.

Unilever U.S. Scholarship. Funded by Unilever U.S., this scholarship for \$7,500 per year is a two-year commitment for the student selected. Students with marketing backgrounds are considered.

Philip Morris Scholarship. Philip Morris USA established this scholarship to provide tuition support to a minority student with career interest in plant operations.

Cyclone Scholarship. This scholarship was established to provide support to Iowa State University graduates who attend the Fuqua School. The award is based on his/her academic performance while attending Iowa State University.

Bristol-Myers Squibb Scholarship. This scholarship was established by the Bristol-Myers Squibb Foundation to support a minority student at the Fuqua School who has expressed an interest in a finance career.

Health Services Management Scholarships. The following scholarships are for Fuqua students in the health services management concentration: Ray Brown Scholarship;

Marshall I. and Sarah W. Pickens Scholarship; ServiceMaster Scholarship; Thomas Frist Scholarship; Alumni Scholarship; and the Alumni Need Scholarship. Selection of recipients is made by the Fuqua School financial aid committee and no special application is required.

Ryder System Minority Scholarship. Provided by Ryder System Inc., this \$5,000 scholarship is awarded to outstanding minority students. The recipient may be either a first- or second-year student.

Second-Year Named Awards

Listed below are the named awards reserved for second-year students who are already receiving Fuqua fellowships/scholarships and have distinguished themselves with high academic achievement and community involvement during their first year of study. Selection of recipients is made during the summer and no special application is required. With the exception of the Class of 1987 and 1988 scholarships, these named awards replace, but would not be less than, the Fuqua fellowship received and do not provide additional scholarship support to the recipient.

Accounting Associates Fellowships. These fellowships were established through the donation of the Accounting Associates, a partnership of Duke University accounting professors. These awards are given annually to M.B.A. students pursuing an interest in accounting.

David S. and Susan Bagwell Endowment. David S. Bagwell, Class of 1973, established this endowment to provide support for a Fuqua student with high academic achievement.

Martin L. Black Fellowships. These fellowships were established by the gifts and donations of alumni and friends of the late Martin L. Black, professor emeritus, and a faculty member in accounting at Duke for over forty years. The awards are given to students planning to concentrate in accounting.

Leo Burnett Scholarship. Awarded to a student showing exceptional talent and ability in marketing and/or advertising, this scholarship also is awarded on the basis of financial need.

Carolinas Cash Management Association Scholarship. This scholarship is awarded annually to a student from North or South Carolina or Virginia who has excelled academically and is oriented towards a career in finance. The gift is made possible through an endowment from the Carolinas Cash Management Association.

The Chase Manhattan Scholarship. Endowed by the Chase Manhattan Bank, this fund provides support to Fuqua students who have proven records of excellence.

Class of 1987 Scholarship. This scholarship was established by the Class of 1987 to provide support for a second-year student who did not receive scholarship aid in the first year; who is active in school and/or extracurricular activities and has achieved high academic standing.

Class of 1988 Scholarship. This scholarship was established by the Class of 1988 to provide support for a second-year student who did not receive scholarship aid in the first year; who is active in school and/or extracurricular activities and has achieved high academic standing.

Class of 1990s Non-Profit and Small Business Internship Award. This award was established as a class gift by the Class of 1990 to provide support for students who choose summer internships with nonprofit/public organizations or small- to medium-sized businesses. The award is selected by an advisory board and is prioritized by non-profit, public organizations, and small- to medium-sized businesses.

The Julian Connally Scholarship Fund. This fund was established by Julian U. Connally, Class of 1930, to provide support for students enrolled in the Fuqua School of Business.

Walter Albert and Bertha Barefoot Corbett Memorial Scholarship. W. Horace Corbett, Class of 1938, and his wife, Valera Murray Corbett, established this scholarship in honor of Mr. Corbett's parents.

The Martin F. C. Emmett/Tambrands Endowment Fund. This scholarship fund was established by the Tambrands Inc. and Martin F. C. Emmett to provide financial assistance to Fuqua students who have achieved high academic standing.

James R. Felts Memorial Scholarship. This scholarship was established by family, friends, and colleagues in memory of Mr. Felts, who was an honorary alumnus of the Health Administration Program. It provides support to Fuqua students in the health services management concentration.

Charles H. Frenzel Scholarship. Named for a former faculty member in the Health Administration Program, this scholarship was funded by the McLeod Regional Medical Center where Dr. Frenzel ended his career. This scholarship provides support for a student concentrating in health services management.

Friends of Fuqua Scholarship. This scholarship was established by an anonymous donor to provide support to Fuqua students based on academic standing.

James G. Hanes Memorial Scholarship Fund. This scholarship was established by the James G. Hanes Memorial Fund/Foundation to provide support for Fuqua students with high academic achievement.

Amerada Hess Corporation Fellowship. This award provides support to one student in each class. Students with work experience in manufacturing, energy, or accounting with undergraduate degrees in engineering, earth sciences, or accounting/finance will be considered for this award by the Fuqua School Financial Aid Committee.

Vivian Edward Hollinshed Scholarship. This scholarship was endowed by Clara K. Hollinshed in honor of her husband. Preference is given to students who have resided in the southeastern region of the United States for at least five years.

Edward A. Horrigan, Jr. Business Scholarship. Edward A. Horrigan, Jr., a former member of Fuqua's Board of Visitors, endowed this fund to provide scholarship support for an American-born U.S. citizen who is largely dependent upon financial aid for the cost of his or her education.

Richard and Mamie Howerton Scholarship. This scholarship was established by Thomas R. Howerton, Duke class of '43 and M.H.A. '48, to honor his parents, Richard and Mamie Howerton. It provides support to Fuqua students in the health services management concentration.

Thomas Crafton Keller Memorial Fund. This was established by Thomas F. Keller in memory of his son, Thomas Crafton Keller, and supports Fuqua students with high academic achievement.

William A. and Anne L. Klopman Scholarships. This endowment fund was established by a donation from William A. and Anne L. Klopman, parents of three Fuqua graduates. Mr. Klopman is retired chairman of Burlington Industries.

Mead Scholarships. Established by the donation of D. Richard Mead, Jr., A.B. 1952, these scholarships are given to students who, without such support, might otherwise not be able to afford graduate study.

James H. Moshivitis Endowment Fund. This scholarship was established by James H. Moshivitis to provide financial support to Fuqua students who have achieved high academic standing.

The Robert Price Scholarship. This scholarship, endowed by Robert Price, a Duke graduate and member of Fuqua's Board of Visitors, recognizes academic achievement.

Howard C. Ris Scholarships. This scholarship is awarded to a Fuqua student who has demonstrated outstanding ability and potential. This endowed scholarship is made possible by a gift from Howard C. Ris, A.B. 1938, retired chairman of Ris Paper Company, Inc.

John W. Rollins Scholarship. This scholarship/loan award is given annually to five second-year students. Rollins Scholars possess outstanding leadership qualities and strong records of academic achievement. This award was established by John W. Rollins, Sr., chairman and chief executive officer of RLC Corporation.

The Ann Williams Vander Weide Endowment Fund. This endowed fund was established by James Vander Weide, research professor at the Fuqua School, in honor of his late wife. This scholarship provides support to Fuqua students who have demonstrated high academic achievement

Herman and Johanna Vander Weide Scholarships. This endowed fund was established by James H. Vander Weide, research professor at the Fuqua School of Business, in honor of his parents.

Financial Aid Application Process. Financial aid award decisions for entering students are made after admissions to the program is offered, with the first awards being made in January for the class beginning in August of that year. All students applying for financial assistance (scholarships, fellowships, loans, or work) must complete the financial aid application form.

STUDENT LOAN PROGRAMS

The Fuqua School participates in long-term student loan programs and the Federal College Work-Study Program. These programs are available to students who demonstrate need according to federal guidelines.

Federal Stafford Student Loan Program.

(A) Subsidized Loan Program: (Need-Based). This federally subsidized low interest loan enables graduate students who qualify on the basis of need to borrow up to \$8,500 per academic year, with aggregate limit (undergraduate and graduate combined) of \$65,000 per student. These funds may be borrowed from local banks, credit unions, savings and loans, and other participating lenders. For loans made to new borrowers after 10/01/92, the interest rate is an annual variable rate (not to exceed 8.25 percent) based on 91-Day T-Bills plus 3.10 percent and set annually in July. The effective rate through 06/30/94 is 6.22 percent. For prior borrowers (currently have loan balance outstanding) loans are at the same rate as previous loans, which may be at 7 percent, 8 percent, or 9 percent and the 8/10 percent rate for borrowers after 06/30/88. Repayment begins six months after graduation or termination of enrollment. The loans are disbursed in one-half each semester, and a 3 percent loan origination fee and a 1 percent guarantee fee is deducted from each disbursement of the loan. The minimum payment per month during repayment is \$50, and the maximum repayment period is ten (10) years.

(B) Unsubsidized Loan Program: (Non Need-Based). The unsubsidized Federal Stafford Student Loan has the same terms and conditions as the subsidized program, but the student is responsible for interest that accrues while he/she is in school. A student may receive both subsidized and unsubsidized Federal Stafford Loans not to exceed the applicable Stafford loan limit of \$18,500. A 6.3 percent loan origination fee and a 1 percent guarantee fee will be deducted from each disbursement of the loan.

A new FAFSA form and loan application must be completed each academic year when applying for loans.

Federal Perkins Student Loan Program: (Need-Based).

This campus-based federal student loan program is administered by the institution with no interest charged while you are enrolled full-time. The annual loan limit provides for loans up to \$5,000 per academic year with aggregate limit (undergraduate and graduate combined) of \$30,000 per student. The interest rate is 5 percent and begins to accrue nine months after graduation or termination of enrollment. Limited funding is allocated to the Fuqua School for this program, and the amount awarded to individual students by the Fuqua School will depend on individual financial need and available funding. A separate application is not required to be considered for the Perkins loan, and no origination or insurance fees are charged. A promissory note and disclosure form for this loan will be completed after you arrive on campus. Perkins loan awards are

contingent on adequate federal funding being received. Should funding not be adequate, the Fuqua School will attempt to replace awards with alternate sources.

Other loans not determined by federal guidelines for those who wish to supplement or replace personal resources.

GradSHARE.

These educational loans through the Nellie Mae Education Loan Program offers graduate and professional students a signature loan based on projected future earnings, rather than on current income and credit worthiness. Annual loan amounts range from \$2,000 to \$7,500 when a student borrows on his/her own, or up to \$15,000 annually with a cosigner. Borrowers can choose between two interest rate options (a monthly variable rate, not to exceed the prime rate plus 2 percent, or a one-year renewable rate, not to exceed the prime rate plus 3 to 4 percent), and have three repayment options: (1) deferred principal and interest payments while enrolled; (2) deferred principal payments while enrolled; (3) fixed monthly payments of principal and interest. Repayment periods range from four to twenty years, depending on the amount borrowed. There is a 6 percent guarantee fee. Your cumulative loan debt for all loans may not exceed \$60,000. For more information contact Nellie Mae, 50 Braintree Hill Park, Braintree, MA 02184 (1-800-634-9308).

M.B.A. Loans Tuition Loan Program (TLP).

This is a private loan made available to business school students by the HEMAR Insurance Corporation of America and Norwest Bank South Dakota N.A. Maximum loan limit is \$15,000 per year with a minimum of twelve years to repay. In school interest is variable, adjusted quarterly and is currently the average 91-day treasury bill, plus 3.25 percent. At repayment (six months after graduation), interest rate is variable and adjusted quarterly not to exceed 91-day T-bills, plus 3.4 percent. In school interest may be deferred until six months after graduation. Deferred interest is capitalized and added to principle once at the time repayment begins. There is an insurance premium which is deducted from loan checks. This premium is 7.5 percent at disbursement and an additional amount added at repayment for loans which are not cosigned. This additional amount is currently set at 2.50 percent. Your cumulative loan debt for all loans may not exceed \$70,000. For more information contact MBA Loans Processing Center, P.O. Box 64722, St. Paul, MN 55164 (1-800-366-6227).

Student Work Program

College Work-Study Program. The College Work-Study Program is federally funded and supports the employment of students while they are in school. Students must meet federal need eligibility standards to qualify for participation and students work an average of six to eight hours per week. With work-study, a student's salary is paid jointly by the federal government and the Fuqua School. Funding from this program is available for students only when employed by the Fuqua School. Students given work-study allocations are responsible for securing their own employment within the school, which offers a variety of employment opportunities for interested students. A job board is available in the M.B.A. program office area to assist in locations employment. Fuqua students average working six to eight hours per week and are paid by the hour bi-weekly for the hours worked. The hourly rate for 1994-95 is \$6.50.



Career Services and Placement



Career Services and Placement

The Career Services and Placement Office recognizes that students enter the Fuqua School of Business with diverse career interests and various levels of job search and career planning skills. Therefore, services are designed to meet a wide range of interests and needs.

The Career Services and Placement Office initiates a comprehensive career planning program early in the first year of study beginning with self-assessment, then career exploration, and finally instruction and refinement of a range of job search skills. The methods used to deliver these services include individual advising sessions, classroom instruction through the IE program, small group workshops, and seminars featuring corporate recruiters and alumni.

Early in the first term, students embark on a self-assessment of their skills, accomplishments, work styles, interests, and goals. Students are encouraged to revisit their self-assessment inventory throughout their two years of study. This knowledge forms the basis for developing a resume, cover letters, and interview themes. In addition, it helps the student identify areas for career exploration.

The Career Services and Placement Office provides many means for career exploration. In addition to a library of career books, articles, and audio-visual tapes, the office facilitates on-campus interaction between students and employers. The annual Job Fair attracts a wide range of businesses to Fuqua's campus early in the fall. This all day event, open only to Fuqua students, provides an excellent opportunity for students and employers to get acquainted and discuss job responsibilities and career paths in an informal atmosphere. Throughout the fall and winter, firms visit Fuqua each evening to host Special Interest Programs (SIPS) where employers and students discuss the company and career opportunities in more depth. Most SIPS open with prepared remarks on an audio-visual presentation by several company representatives, followed by a question and answer period where students and employers mingle in a social setting. The annual Career Exploration Day brings alumni to campus to present workshops on what it is really like to work in various career areas (i.e., investment banking, product marketing, or consulting).

The Career Services and Placement Office staff is committed to preparing all students to face the challenges of a job search. The development of a solid set of job search skills and strategies is critical to successful long-term career management. The office works closely with each student to develop a resume that highlights each student's unique background and skills. Resume guidance begins with classroom instruction followed by individual critiques with the professional staff. After completion of the resume, the Career Services and Placement Office and the Management Communication Center provide classroom instruction and individual guidance on writing persuasive job search correspondence to accompany the resume.

Focus then shifts to developing excellent interview skills. Training begins with classroom instruction on how to interview effectively, and then students participate in a Mock Interview Program. This video-taped interview provides students an opportunity to experience a realistic interview for a particular position of interest to them. Students then receive constructive feedback while reviewing the tape with a member of the office's professional staff. The Mock Interview Program is supplemented by a library of video-taped mock interviews conducted and critiqued by employers. The Career Services and Placement Office also administers a Recruiter Feedback Program where students further polish their interview skills based on interview feedback the office receives on each student from on-campus recruiters.

The Career Services and Placement Office helps students secure summer and permanent employment by managing an active on-campus interview program, publishing employer job opportunity notices, and by advising students on individual job search strategies.

The comprehensive career planning program is designed to teach students job search and career planning skills that they will use not only to secure their first jobs after business school but throughout their career. In addition, Fuqua alumni may continue to use the resources of the Career Services and Placement Office at anytime in their career.



1993-1994 Participating Organizations

Acquisition Services Consulting Group
Adams-Millis
Advisory Board Company
AEA Investors, Inc.
AlliedSignal Aerospace Sector
AlliedSignal Automotive Sector
AlliedSignal Engineered Materials Sector
AlliedSignal Inc.
Amerada Hess Corporation
American Airlines
American Airlines CARGO Department
American Express Company
American Express-Credit Policy & Risk Mgmt
American International Group
American Management Systems, Inc.
Amgen, Inc.
Andersen Consulting
Arthur Andersen & Company
Bankers Trust Company
BASES Group
BellSouth Enterprises, Inc.
Best Foods
BFGoodrich Company
Booz Allen & Hamilton Operations Mgmt Group
Booz Allen & Hamilton Inc.
Boston Consulting Group, Inc.
Burroughs Wellcome
Chase Manhattan Bank, N.A.
Chemical Bank
Chemical Bank Retail Banking Group
Chesebrough-Pond's USA
Chrysler Corporation
CIBA-GEIGY Pharmaceuticals
Citibank, N.A.
Coastal Health Care Group, Inc.
Coca-Cola Beverages Group
Coca-Cola U.S.A.
Colgate-Palmolive Company
Compaq Computer Corporation
Comuter Sciences Corporation
ConAgra Poultry Company
Conner Peripherals
Continental Airlines, Inc.
Continental Bank
Coopers & Lybrand
Cordis Corporation
Corning, Inc.
Cryovac Division
CS First Boston
CSX Technology
Deloitte & Touche
Diagraph Corporation
Disney Consumer Products
Dominos Pizza, Inc.
EDS Management Consulting Services
Emerson Electric Company
Equifax Credit Information Services, Inc.
Equifax Inc.
Ernst & Young Health Care Consulting Group
Ernst & Young Mgmt Consulting Group (SO)
Ernst & Young Mgmt Consulting Group (NE)
Ethicon Endo-Surgery
Exxon Company, U.S.A.
Federal Express Corporation
Fidelity Investment Brokerage Group
Fidelity Investments Money Market Division
First Chicago
First Chicago Futures, Inc.
First Union National Bank of North Carolina
Fitch Investors Service, Inc.
Ford Motor Company
Furniture/Today
Furon Company
GE Capital Corporate Finance Group Inc.
GE Capital Services Transportation & Funding
GE Consumer Service
GE Corporate Audit Staff
General Electric Company
General Motors (NAO) North American Operations
General Motors Corporation
Georgetown Industries, Inc.
Glaxo Inc.
Goldman, Sachs & Co. Fixed Income Division
Goldman, Sachs & Co. Private Client Services
Goldman, Sachs & Company Equities Division
Goldman, Sachs & Company Global Operations
Hackney & Sons, Inc.
Hamilton-KSA
Harvard Community Health Plan, Inc.
Hughes Aircraft
IBM Corporation
International Paper Company
ITT Corporation
IVAC Corporation
J.P. Morgan & Co. Incorporated
James River Corporation
Johnson & Johnson Consumer Products Inc.
Johnson & Johnson International
Johnson & Johnson Personal Products
Johnson & Johnson Vision Products, Inc.
Kappler Safety Group, Inc.
Kidder, Peabody & Company
Kimberly-Clark Corporation
Kraft General Foods - Kraft USA
L&F Products
Legg Mason Wood Walker, Ind.
Lehman Brothers
Lever Brothers Company
Lloyd & Company
Mars, Inc.
Mattel Toys Inc.
McKinsey & Company, Inc.
McNeil Consumer Products Company
Merck & Company, Inc.
Merck Human Health Division - US
Merrill Lynch & Co.
Microsoft Corporation
Milliken & Company
Minerva Capital Corporation
Minwax Company, Inc.
Mobil Corporation
Morgan Keegan & Company, Inc.
Morgan Stanley & Co. Incorporated

Nabisco Foods Co., - Special Products Division
 National City Corporation
 NationsBank Company
 NCR Corporation
 New York Life Insurance Company
 Nissan Motor Corporation
 Nomura Securities International
 Northern Telecom
 Northwest Airlines
 Otis Elevator Company
 Pemco Aeroplex
 Philip Morris U.S.A. - VA
 Philip Morris U.S.A. - NY
 Pizza Hut, Inc.
 Planters LifeSavers Company
 Playtex Products, Inc.
 Price Waterhouse (Bethesda Office)
 Price Waterhouse (DC & NY Offices)
 Price Waterhouse Valuation Svcs (PA Office)
 Primerica Financial Services
 Procter & Gamble Company
 Procter & Gamble Company - Brand Division
 Procter & Gamble International Recruiting Division
 Promus Companies
 Public Consulting Group, Inc.
 Putnam Companies
 Reckitt & Colman
 Roland Berger & Partner GmbH
 Ryder System, Inc.
 SABRE Technology Group
 Salomon Brothers - Private Investment Dept.

Salomon Brothers - Research Division
 Salomon Brothers - Sales & Trading Division
 Salomon Brothers - Investment Banking Division
 Sara Lee Hosiery
 Sara Lee Intimates - Playtex Apparel, Inc.
 Sara Lee Intimates - Bali
 Sara Lee Knit Products
 Schering-Plough Corporation
 Scott Paper Company
 Scott, Madden & Associates
 Siecor Corporation
 Smith Barney Shearson Inc.
 Sonat Offshore Drilling
 Sony Electronics, Inc.
 Sprint Corporation
 Swiss Bank Corporation
 Telecommunications Technique Corporation
 Texaco, Inc.
 The Southern Company
 Thomson Consumer Electronics
 Tiber Group
 TRW, Inc.
 Unilever United States, Inc.
 W.P. Carey & Company, Inc.
 Wachovia Bank of Georgia
 Wellington Partners
 Westvaco Corporation
 Wheat First Butcher & Singer
 Windsor Group
 Xerox Corporation



Student Life



Living Accommodations

Most M.B.A. students live off campus in housing or apartments not owned by the university (see the section entitled Off-Campus Housing). However, Duke University has residential facilities in which some graduate and professional students may live.

Town House Apartments. Town House Apartments, located about three blocks from the main East-West Campus bus line, is a thirty-two-unit complex, which houses only graduate and professional school students. These apartments are more spacious than most apartments found on campus or in Durham. Because of their location away from the academic facilities, students find that these apartments offer a change from normal campus life and activities. They are available for continuous occupancy throughout the calendar year.

Each apartment includes a living room, a master bedroom, a smaller bedroom, a bath and a half, and a kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months. All Town House Apartments are completely furnished by the university. An itemization of furnishings is included with the floor plans sent out in the application packet.

All utilities—water, heat, air-conditioning, and electricity—are provided. Residents must make arrangements with the local utility company to pay for telephone service. Usually a deposit is required when initial application for service is made. The utility company should be contacted prior to arrival as it usually takes several days to obtain service. Residents must provide their own phones.

Central Campus Apartments. Apartments in this 500-unit complex are available throughout the calendar year for continuous occupancy to single students attending graduate and professional school and undergraduate schools.

Located in the center of the complex is a swimming pool (open during the late spring and throughout the summer months), a convenience store, and a pub.

All Central Campus Apartments are completely furnished by the university. An itemization of furnishings is included with the floor plans sent out in the application packet.

All utilities—water, heat, air-conditioning, and electricity—are provided. Central Campus Apartments' residents are responsible for making arrangements with Duke University's Tel-Com telephone service to pay for telephone service. Residents must provide their own phones.

Efficiency, two-bedroom, and three-bedroom apartments are rented to students. Efficiency units are very limited in number and are generally not available to new

students. Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic year to the university. This method permits students to share apartments with others of their choice. When this is impractical, the Department of Housing Management strives to place persons with similar interests together.

Application Procedures. When students are informed of their acceptance to the business school they will also receive a postcard on which to indicate preference for university housing. This postcard should be returned to the Department of Housing Management. Detailed information on the types of accommodations and application forms will be forwarded to the accepted student. Assignment to all university housing is made on a first-apply, first-assigned basis and is not guaranteed.

Off-Campus Housing. The Department of Housing Management maintains a listing of rental apartments, rooms, and houses provided by property owners or real estate agencies in Durham. These listings are available in the department only; during the summer an assistant is available to answer questions and aid students in their attempts to obtain housing off-campus. Information on commercial complexes in the Durham area may be obtained by indicating a preference for off campus housing on the postcard which you receive with your acceptance packet. Except for assuring that owners sign a statement of nondiscrimination, off-campus property is in no way verified and neither the university nor its agents negotiate between owners and interested parties.

The search for accommodations should begin as soon as possible after acceptance to the business school. A visit of two or three days will allow the opportunity to make use of the off-campus service and to inspect personally the availabilities.

Food Services

Duke University Food Services (DUFS) operates a variety of dining facilities including "all you can eat" cafeterias, a la carte restaurants, fast food facilities, salad bars, seated dining restaurants, and an on-campus pizza delivery service.

Graduate and professional students may choose to pay for food purchases in cash, or they may opt to open a prepaid account. There are two accounts which a student may open—a food only dining plan and a flexible spending account. The flexible spending account may be used to purchase any food items sold by DUFS, any items sold in the university stores, and to purchase beer and wine, where available.

For more information about opening either a flexible spending account or a dining account, contact the Auxiliary Services contract office at (919) 684-5800.

In addition to the above university food services, the Fuqua School of Business has its own cash-only snack bar, The Kiosk, which serves a limited menu of light snacks, sandwiches, and beverages during normal business hours.

Other Services

Bus Service. Free on-campus bus service is provided by the university connecting East, West, North, and Central Campuses, Science Drive and intermediate on-campus locations. Bus service is also provided between Duke Manor and Chapel Tower Apartments and the campus, during the academic year only. Printed schedules are available at the Bryan Center Information Desk, the Housing Management service offices, and from the transportation office located at 712 Wilkerson Avenue, just off East Campus behind Brightleaf Square. Schedules are also posted at each of the major bus stops.

Route, schedule, and employment information is available weekdays by calling (919) 684-2218.

University Stores. University Store operations on campus sell textbooks, school supplies, health and beauty items, room accessories, gifts, clothes, and food items. Items

may be purchased with cash, check, Visa or Mastercard, or on the Duke Card flexible spending account (see description under Food Services).

The Bryan University Center is the location of four of the stores' operations: the University Store sells school, office and computer supplies, and gift items with Duke University's official logos; the Duke University Bookstore sells textbooks, technical reference books, study aids, and computer software; the Gothic Bookshop stocks new fiction and nonfiction titles; and the Lobby Shop sells magazines, newspapers, health and beauty aids, and snack foods.

Student Activities

M.B.A. Student Association. The association serves as liaison between the students and faculty and administration in both academic and nonacademic matters. The structure of the association includes many standing and ad hoc committees dealing with concerns such as admissions and placement, computer and library facilities, intramural sports participation, alumni, and social events.

Cocurricular Activities. Graduate students at Duke University are welcome to use such university recreational facilities as swimming pools, tennis courts, and a golf course, and to affiliate with the choral, dance, drama, music, and religious groups. Doctoral students may become junior members of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities.

A full program of cultural, recreational, and religious activities is presented by the Office of Cultural Affairs, the Duke University Parish Ministry, the Duke University Union, the Office of Student Activities, and recreational clubs. The Duke University Union sponsors a wide range of programs through its committees which are open to all segments of the campus community. Included are touring Broadway shows; rock, jazz, and pop concerts; speakers; films; a film-making program; a student-run television station; art exhibits in two galleries; and a broad program in crafts located in Southgate Dormitory and the Bryan University Center.

The University Center complex includes the new Bryan University Center, which houses the Information Center, two drama theaters, a film theater, lounges, stores, meeting rooms, games room, rathskeller, art gallery, and other facilities; the West Union which includes dining facilities; and Flowers Building, which includes student publications, Page Auditorium, and the university box office.

Inquiries should be directed to the Intramural Office, 105A Card Gymnasium; the Office of Cultural Affairs, 107 Page Building; Duke Chapel; the Duke University Union, Bryan University Center; or the Office of Student Activities, Bryan University Center.

Full information regarding the scheduling of major events and programs for the entire year will be found in the Duke University *Annual Calendar*; detailed and updated information for the fall and spring semesters in the *Weekly Calendar*, available each Friday; updated information for the summer session in the *Summer Session Calendar*, published at the beginning of each summer term; and the *Duke Chronicle*, published each Monday through Friday during the fall and spring and each Wednesday during the summer. Copies of the Duke University calendars may be obtained at the information desk, Flowers Building, or the calendar office, Page Building. Also during the summer, the *Summer Session Newsletter* is published weekly by the summer session office and is available at convenient locations.

Intramural and Recreational Sports. The Duke recreational and intramural programs provide all students with opportunities to participate in some form of healthful, informal, and competitive physical activity. In a typical year, more than 3,000 students compete for many intramural titles and trophies.

The men's and women's intramural programs include many different activities (e.g., bowling, cross-country, golf, handball, horseshoes, table tennis, volleyball, soccer,

softball, and track). In addition, special events in other areas of interest are held. Various performing clubs, including one for water ballet, offer the student opportunities to take part in extracurricular activities. Through coeducational intramurals, the student is encouraged to participate on a less competitive level, promoting relaxed social and physical activity. Opportunities for competition between men and women are provided in areas that include archery, badminton, basketball, softball, racquetball, squash, table tennis, tennis, volleyball, and water polo.

The university's varied athletic and recreational facilities and equipment are available for use by students. The facilities for recreation include a golf course, lighted tennis courts, three swimming pools, squash and racquetball courts, three gymnasiums, a weight training room, outdoor handball and basketball courts, an archery range, horseshoe courts, an all-weather track, numerous playing fields, jogging and exercise tracks, and informal recreational areas. More than thirty sports clubs dealing with gymnastics, scuba diving, sailing, cycling, crew, riding, fencing, football, frisbee, ice hockey, kayaking, lacrosse, badminton, karate, rugby, soccer, and other activities are available to interested students.

Graduate and Professional Student Council. The Graduate and Professional Student Council is the representative body for the students of graduate departments and professional schools. The council provides a means of communication between schools and between graduate students and the administration. The council selects graduate students for membership on university committees. Representatives of each department and officers of the council are selected annually.

Religious Life. The Duke Chapel is open daily for prayer and meditation. The Sunday morning worship in the Chapel at 10:55 A.M. is the central focus for university religious life. The Chapel Choir is open to those who wish to sing in it. The Benjamin N. Duke Memorial Organ is played Monday through Friday from 12:30 P.M. to 1:30 P.M. Special guest recitals are also scheduled. The ministers and other members of the Chapel and Religious Life staffs are available to provide counseling help and other assistance as needs arise.

Health Care

Medical Care. The aim of the Student Health Service is to provide any medical care and health advice necessary to the student as a member of the university community. The health service maintains the Student Health Services Clinic located in the Pickens Building on West Campus. Emergency transportation can be obtained by the Duke campus police. A separate fee for the Student Health Service is assessed.

The Student Health Services Clinic offers the student outpatient services, routine laboratory and X-ray examinations in the clinic for the treatment of acute illness or injury, and advice and assistance in arranging consultation for medical treatments. Fees for such consultations or treatments must be paid by a student who is not covered by an insurance plan.

The facilities of the University Infirmary, located in Duke Hospital South, are available to all currently enrolled full-time students in residence during the fall and spring. Hospitalization in the University Infirmary is provided for treatment of acute illness or injury as authorized by the Student Health Services Clinic physician. Students are required to pay for their meals while confined to the infirmary. The resources of the Duke University Medical Center are available to all Duke students and their spouses and children. Any bills incurred at Duke Hospital or any other hospital are the responsibility of the student, if not covered by an insurance plan. The Student Health Program does not provide health care for spouses and dependent children of married students. Coverage of the married student's family is provided in the university's Student

Accident and Sickness Insurance Plan for an additional fee. Refer to the chapter, "Financial Information," for complete information on this plan.

Counseling and Psychological Services. CAPS provides a comprehensive range of counseling and psychological services to assist and promote the personal growth and development of Duke students. The professional staff is composed of clinical social workers, psychologists, and psychiatrists experienced in working with young adults. Among services provided are personal, social, academic, and career counseling. A number of short-term seminars or groups focusing on skills development and special interests such as coping with stress and tension, fostering assertiveness, enriching couples' communication, and dealing with separation and divorce are also offered. A policy of strict confidentiality is maintained concerning information about each student's contact with the CAPS staff. Individual evaluation and brief counseling/therapy as well as career and skills development seminars are covered by student health fees. There are no additional charges to the students for these services. Appointments may be made by calling (919) 660-1000 or visiting CAPS, 214 Page, West Campus.

Academic Procedures and Information



Registration

Students enrolled in the Fuqua School of Business must register each semester until all degree requirements are completed. New matriculants register during orientation week. In the case of independent studies, courses outside the school and overloads, it will be necessary to obtain the permission of the instructor and the M.B.A. program director.

Late Registration. All students are expected to register at the times specified by the university.

Change of Registration. During the first *week* of the semester, registration may be changed with approval of the Fuqua program director.

Academic Requirements for the M.B.A. Program

Grading. The grading scale for M.B.A. students is: Superior Pass (*SP*)-4.0; High Pass (*HP*)-3.5; Pass (*P*)-3.0; Low Pass (*LP*)-2.5; and Fail (*F*).

Continuation Requirements. An M.B.A. student is expected to complete all courses approved by the program director for a given semester and attain a GPA of 3.0 to proceed to the next semester of the program.

Any student who receives a grade of fail (*F*), or a grade point average of less than 3.0 after any term, will be subject to academic performance review. The student's academic standing is determined during the performance review by the respective program director and the faculty of the Curriculum Committee. Any mitigating circumstances that may have inhibited a student from making satisfactory progress will be heard and evaluated at that time.

In order to be certified as making satisfactory progress toward the degree, a student enrolled in the M.B.A. program must:

1. Complete all courses approved by the program director for a given semester and attain a GPA of 3.0 or: have been reviewed by the program director and faculty of the Curriculum Committee, where it must be determined that mitigating circumstances did inhibit the student from meeting all course requirements or attaining a 3.0 GPA. Under these circumstances the student

will be allowed to continue the program with a GPA below 3.0 and still be considered as making satisfactory progress toward the degree.

2. Complete the program according to the following schedule: a minimum of 48 credits in the first academic year of the program, and 85 credits by the end of the second academic year of the program.

Students enrolled in the Evening Executive M.B.A. Program must complete a minimum of 24 units during the first academic year and 24 units during the second academic year.

Students on official leaves of absence from any program will be exempted from these requirements for the duration of that leave.

Graduation Requirements. An M.B.A. student who has successfully completed all program requirements and has earned a grade point average of at least 3.0 will be graduated.

Course Exemptions. It is possible to obtain an exemption from any of the first year required courses. This may happen in one of two ways. The first is administrative exemption, that is, transcripts of entering students are reviewed prior to their arrival and exemptions are offered in areas where prior satisfactory course work is documented. This first method of exemption is applicable only to daytime M.B.A. students. The second is by passing an exemption exam in the subject matter of that course.

No course work done before matriculation at Fuqua is transferable to the M.B.A. degree.

Standards of Conduct. Duke University expects and will require of all its students' cooperation in developing and maintaining high standards of scholarship and conduct. The university wishes to emphasize its policy that all students are subject to the rules and regulations of the university currently in effect or which are put into effect from time to time by the appropriate authorities of the university.

Any student in accepting admission indicates a willingness to subscribe to, and be governed by, these rules and regulations and acknowledges the right of the university to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the university.

The Fuqua School of Business has established its own Honor Code which is overseen by a Judicial Board comprised of three faculty and three student members. The Honor Code governs conduct and the integrity of student scholarship.

Commencement

Graduation exercises are held in May for daytime students and in October for Weekend Executive M.B.A. students. At this time degrees are conferred and diplomas are issued to those who have completed requirements.

Other Information

Student Records. Duke University adheres to a policy permitting students access to their student records, with the exception of confidential letters of recommendation received prior to January 1, 1975, and certain confidential financial information. Students may request review of any information which is contained in their student records and may challenge the content of their records by appropriate procedures. An explanation of the complete policy on student records may be obtained from the associate registrar of the university.

No information contained in student records (academic or otherwise) is released to persons outside the university or to unauthorized persons on the campus, without the consent of the student. A student grants consent by signing a form which authorizes the

consent of the student. A student grants consent by signing a form which authorizes the release of data. Specific consent is required for the release of information to any person or organization outside the university, and it is the responsibility of the student to provide the necessary authorization and consent. Students are assessed a one-time transcript fee of \$30. Official transcripts may be sent by the university registrar at the signed request of the student. Send written, signed requests for transcripts, including full name, school attended, social security number, where the transcript(s) is to be sent, and your address for acknowledgement to: Office of the Registrar, Duke University, Box 90055, Durham, NC 27708-0555; or you may fax your signed requests to (919) 684-4500.

Reciprocal Agreements with Neighboring Universities. Under a plan of cooperation between Duke University and the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro, North Carolina Central University in Durham, and North Carolina State University at Raleigh, students properly enrolled in the Fuqua School of Business during the regular academic year, and paying full fees to this institution, may be admitted to a maximum of two courses per semester and four courses total at one of the other institutions in the cooperative plan. Under the same arrangements, students in the graduate schools in the neighboring institutions may be admitted to course work at Duke University. All interinstitutional registrations involving extra-fee courses or special fees required of all students will be made at the expense of the student and will not be considered a part of the Duke University tuition coverage.

Identification Cards. Graduate students are issued Duke University identification cards which they should carry at all times. Students must validate the card each semester with the university registrar. The cards are the means of identification for library privileges, athletic events, and other university functions or services open to them as university students. Students will be expected to present their cards on request to any university official or employee. The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of a card immediately to the registrar's office. The cost of a new identification card is \$5.

Courses of Instruction



Master of Business Administration

Core and Elective Courses

The core curriculum of the M.B.A. Program is on page 14 of this bulletin. Unless specified otherwise, each course is worth three units of credit.

200. Foreign Language Topics. In keeping with the Fuqua School's strong commitment to providing an international perspective in the MBA program, this series of courses enables students to begin or continue study in one of several foreign languages. 3 units. *Staff*

300. Managerial Economics. This course considers how the actions of business firms, consumers, and the government—operating within a price system in a decentralized market economy—answer such basic resource allocation questions as what will be produced, how it will be produced, who will consume what is produced, and what resources to divert from present consumption to increase future consumption. The impact of various types of market structures (such as perfect competition, monopoly, and oligopoly) on economic efficiency will be discussed. Provides the student with an ability to view resource allocation problems within a constrained optimization framework and with some practice in applying marginal analysis. 3 units. *Staff*

301. Economic Environment of the Firm. This course provides an analytical framework for understanding the economic forces that shape business decisions. It examines the behavior of unemployment, inflation, the trade balance, interest rates, and exchange rates. Special emphasis is placed on government policy towards these variables and current economic problems. 3 units. *Staff*

303. Microeconomics for Managers. Provides an alternative to Business Administration 300 for those students with intermediate or advanced backgrounds in mathematics. Both courses address the same topics. They develop the students' ability to apply economics to understanding the market environment in which managerial decisions are made and provide a structure for the managerial decision-making process. Prerequisite: intermediate or advanced knowledge of business mathematics. 3 units. *Staff*

311. Probability and Statistics. Examines structures for managerial decision making under conditions of partial information and uncertainty. After developing a foundation in probability theory, the course extends this foundation to a set of methodologies for the analysis of decision problems. Included are topics in probability, statistical inference, and regression analysis. 3 units. *Staff*

312. Decision Models. Examines the principles and techniques of building quantitative models to aid managerial decision making. Special emphasis is placed on utilizing models for structuring and analyzing resource allocation problems and decision problems under uncertainty. Topics include linear programming, decision analysis, and simulation. 3 units. *Staff*

320. Managerial Effectiveness. Provides an introduction to the study of the behavior of individuals and groups within organized settings. The relationship of organizations to their environments is also examined. Emphasis is given to managerial strategies which enhance organizational effectiveness. Topics include leadership, selection and training, motivation and reward systems, decision making, conflict management, and organization structure and design. A mixture of lectures, cases, and experimental exercises is used to develop managerial skills. 3 units. *Staff*

330. Financial Accounting. Introduces the student to the types of information requirements imposed on the firm by agencies in its environment and develops an understanding of the activities of the firm within the framework of a financial accounting system designed to satisfy these information requirements. Emphasis is given to the study of financial accounting, reporting, and measurement problems from a theoretical and an applied basis, using cases and topical problems in financial accounting as a foundation for the learning experience. 3 units. *Staff*

331. Managerial Accounting. Focuses primarily on managers who are users rather than preparers of accounting information. Examines the use of accounting information in its major functions of planning, control, and product costing. Specific topics include cost estimation, budgeting, standard costing, control and performance evaluation, cost allocation, information systems, data limitations, and rational decision making using accounting information. 3 units. *Staff*

341. The International Environment. This course seeks to analyze the major social, political, cultural, economic, and legal dimensions of the changing world environment, the institutions and policies through which different communities control the activities of the business firms and the impact of these forces on the business firm. The environment is treated holistically and the nation state is analyzed assuming the actions of national governments are made to achieve national strategies and that these actions are important determinants of the business environment. 3 units. *Staff*

342. Ethics in Management. The objective of the course is to achieve an awareness of ethical dilemmas that arise in the conduct of business within a corporation and between a corporation and its many constituencies. It also will sharpen diagnostic skills in analyzing ethical issues and in devising personal and organizational responses. The course examines ethical dilemmas arising in relationships between the firm and its customers, vendors, competitors, employees, investors, society, and local communities and the relationships between employees and of employees to the firm. The course will trace the evolutionary emergence of ethical and moral expectations in western civilization considering societal responses for resolving ethical issues. 3 units. *Staff*

343. Managing the Governmental Relationship. Provides the student with an ability to understand and manage private sector problems and opportunities created by government programs. By examining the processes used by the legislative, executive, and judicial branches to create, implement, and enforce laws and regulations, the prospective manager will be prepared to compete effectively in markets controlled or affected by government activities. The course will consider the management problems created by the United States antitrust laws and various government agencies regulating environmental hazards, energy, and health and safety. 3 units. *Staff*

344. International Strategy. Examination of the reasons for location of production in the world, laying the conceptual foundations for three levels of analysis: the country, the industry, and the firm. It extends competitive analysis to a multinational context, analyzing the globalization of markets and the way market factors, technological shifts, governmental policies, and other factors cause a shift in the comparative advantage of firms. The course also deals with the impact of strategic choices of government/business interaction in both developed and developing countries, and implementation issues of how strategic changes are managed across borders. 3 units. *Staff*

345. Legal Environment of the Firm. Considers the legal environment of the firm with emphasis on the legal system, the process by which laws are formulated and changed, and the type and forms of legal constraints imposed on firms. Also examined are major legislation, court cases, and regulation by federal agencies which affect the firm's decisions. Prerequisite: second-year standing in the Master of Business Administration program or consent of instructor. 3 units. *Staff*

350. Financial Management. Provides an overview of corporate finance, financial markets, portfolio diversification, and asset pricing. Since firms must understand financial instruments and how the market views them before making decisions about which ones to use, fundamental issues and models of risk, return, and asset pricing are presented. Exercises and cases require students to project short-term and long-term financial needs, value bonds and stocks, and critique capital budgeting techniques. Futures and options markets are introduced, and students briefly manage portfolios of those contracts. Major corporate finance issues of debt and dividend policies are examined. 3 units. *Staff*

360. Marketing Management. Provides an overview of the marketing function in business firms by acquainting students with the fundamental issues and decisions involved in planning and managing marketing activities. Attention is given to the strategic marketing decisions of new product development, product policy, pricing, advertising and communications, marketing research, personal selling, and channels of distribution. Major emphasis is placed on developing an understanding of the underlying forces which influence marketing decisions, including buyer behavior, competitive marketing activity, organizational considerations, and governmental regulation. 3 units. *Staff*

370. Operations Management. Covers issues in the design, planning, and control of the process by which goods are manufactured and services are delivered. Specific topics include analysis of production processes, total quality management, managing process technology and innovation, productivity and work-force management, production planning and control, and the strategic role of operations in the firm. 3 units. *Staff*

381, 382, 383, 384. Individual Effectiveness. These courses integrate the expertise of the Computer Center, the Management Communication Center, and the Career Services Office to provide both immediate and long term benefits to students. Objectives include: (1) providing timely computer education and support in core courses; providing instruction on software tools to enhance managerial decision making; (2) providing opportunities to develop the personal interaction capabilities necessary for success in the Fuqua School and in managerial careers; and (3) acquainting students with the challenges in career planning and development; equipping students with the skills necessary to prosper in the placement process. 2 units each. *Staff*

401. Integrative Learning Experience: Team Building and Leadership Development. The primary objective of the first ILE is to provide experiential and classroom-based personal development opportunities in teamwork, leadership, and social responsibility. 2 units. *Staff*

402. Integrative Learning Experience: Competitive Business Strategy. This ILE provides students the opportunity to use a computer-based, strategic-management simulation to operate a company in a competitive environment. 2 units. *Staff*

403. Integrative Learning Experience: Competitive Advantage through People and Processes. People, and how they are managed, are an increasingly important source of competitive success. This course will explore issues related to this source of competitive advantage. 2 units. *Staff*

404. Integrative Learning Experience: Complex Management Problems. During the final ILE students address from a general management perspective a major contemporary and controversial issue that has the potential to shape the course of business over the next decade. The issue requires political, economic, historical, cultural, and legal and cross-functional considerations. 2 units. *Staff*

410. Decision Analysis. Managers must operate in an environment with many uncertainties, and they are faced with a variety of risky choices involving many conflict-

ing factors. They need to take account of uncertainties and multiple objectives and to select appropriate risk postures. Decision analysis provides a framework for analyzing decision-making problems under uncertainty by breaking them down into more manageable parts. The study of decision analysis involves some formal methods, but perhaps even more important, it suggests a useful way of thinking about and approaching risky decisions. 3 units. *Staff*

411. Statistical Forecasting. Increased access to computer data bases and modeling tools presents the modern manager with opportunities and challenges to use statistical data analysis in forecasting, planning, and decision-making. This course will cover the use of major statistical forecasting techniques, including multiple-regression and time-series models, that are applicable in many functional areas of business. It will emphasize hands-on computing with a microcomputer statistics package. 3 units. *Staff*

412. Operations Research Methods. Surveys the methodologies of operations research and shows how they can be applied to decision-making situations. The course will be concerned primarily with selecting which tool to use in various situations, rather than algorithmic details. Topics to be covered include dynamic programming, stochastic programming, integer programming, nonlinear programming, Markov chains, inventory theory, and linear model formulation. 3 units. *Staff*

413. Quality Control. The objective of this course is to study issues relating to the management of quality. Special attention is paid to tools for data analysis. The application of statistical procedures, the interpretation of results, and the implications for managerial decisions are highlighted. 3 units. *Staff*

414. Applied Econometrics. The purpose of this course is to give students hands-on experience in applying econometric tools, primarily regression analysis, to analyze both classic and contemporary data sets. The course extends the introductory statistics course by providing extensive applications of the tools of regression analysis. It complements the elective in time-series analysis, but there is very little overlap between the two electives. The course is designed for quantitatively-oriented students who wish to learn more about statistical analysis and who wish to develop the ability to estimate statistical models derived from both micro- and macroeconomic theories. 3 units. *Moore*

421. Power and Politics in Organizations. Examines the interplay of power and politics in organizational settings with particular emphasis on the use of influence strategies in managerial decision making. Specific topics to be included are understanding the role of power in organizations, its sources and conditions for use, political strategies and tactics, and specific organizational issues such as resource allocation, career politics, organizational change, and retrenchment. Relevant research and theory will be examined but students will be encouraged to make practical application in decision-making situations through case analyses and discussion, and the development of personal skills in the politics of management. 3 units. *Staff*

422. Dynamics of Bargaining. Explores the processes of bargaining and negotiation; the dynamics of interpersonal and intergroup conflict; and understanding of theory and research related to processes of influence, negotiation, and conflict management. A second part will emphasize skill development through extensive case analysis, role playing, and simulation. 3 units. *Staff*

423. Strategic Human Resource Management. Provides an understanding of issues and challenges involved in the management of human resources in contemporary, complex organizations. The topics discussed include employee selection and placement, training and development, compensation and reward systems, performance evaluation, career development, human resource planning, international human resource management, and the contribution of human resource management to overall organizational

effectiveness. The cultural and legal contexts of human resource practices are also addressed. Perspectives for this course are from the line or operating managers primarily. The roles of the personnel department and the personnel specialists are evaluated. 3 units. *Staff*

424. Managerial Leadership. Explores what is known about effective management and leadership in organizations, and helps prospective managers identify and improve their own leadership skills. To achieve these purposes, the course will alternate between a review of past research on organizational leadership and practical skill development. Readings and class discussion will provide exposure to various models of effective managerial behavior. Students will have an opportunity to experiment with, observe, and practice the skills being considered. Topics include leadership style, organizational politics, decision making, appraising performance, planning and time management, improving group effectiveness, and conflict management. Prerequisite: second-year standing in the Master of Business Administration program or consent of instructor. 3 units. *Staff*

425. Managerial Decision Making. Focuses on helping managers to understand and improve decision making. The primary objective is the development of skills in the use of computer-based decision aids that exploit the intellectual strengths of humans while overcoming their cognitive limitations. Of particular interest will be the techniques of risk and decision analysis. Case discussions, experiential exercises, as well as lectures, will be used to help develop an appreciation of the potentials of various decision aids. Prerequisite: second-year standing in the Master of Business Administration program or consent of instructor. 3 units. *Staff*

426. Organizing Business Activities. The object of this course is to understand the nature of the problems of organizing so that the solutions that emerge match the part or the whole of the organization to its goals, and to make both these fit the internal and external environments. The work includes readings, cases, and examinations of actual contemporary organizing problems and decisions. This course is intended for the student who is interested in getting it together, making it happen, writing the playbook, and staying with it. Prerequisite: second-year standing in the Master of Business Administration program or consent of instructor. 3 units. *Staff*

428. Managing Technology and Innovation. Examines managing innovation, new technology, new product development, and research in the changing enterprise. Topics include the management of project selection, project implementation, manpower and resource allocation among competing activities, budgeting, productivity measurement and enhancement, conflict and coordination among organizational subunits, adaptive organizational subunits, adaptive organizational forms, devising incentives and reward schemes for engendering new ideas, and risk taking. The course will use a combination of readings, lecture/discussions, cases, and guest lectures by managers. Students are encouraged to do field studies. Prerequisite: second-year standing in the Master of Business Administration program or consent of instructor. 3 units. *Staff*

429. Managing the Professional Service Organization. This course examines the management of professional service organizations, with emphasis on the management of health service organizations. Professional service organizations include health, law, accounting, education, engineering, and architecture. 3 units. *Staff*

430. Corporate Financial Reporting I. Examines problems of asset and liability valuation and the related issues of income determination from the perspective of the professional accountant. The information needs of financial statement users are emphasized. Frequent reference is made to professional accounting pronouncements. Prerequisites: Master of Business Administration standing, one course in financial accounting, and one course in managerial accounting. 3 units. *Staff*

431. Corporate Financial Reporting II. Examines advanced topics in financial accounting from the perspective of the professional accountant. Specific attention is devoted to the accounting and reporting problems of complex corporate enterprises. Topics include consolidated financial statements, partnerships, and not-for-profit accounting. Prerequisite: Business Administration 430. 3 units. *Staff*

432. Measurement and Control of Product Costs. Study of the relationship between product costing systems and strategic analysis. Strategic planning depends heavily on the output of cost accounting systems, and decisions based on incorrect product costs are likely to be wrong. Furthermore, productivity improvements cannot usually be made unless reliable cost data are available. Recently many firms have discovered that their cost systems do not supply reasonable information. Apparently profitable products actually lose money, and relevant data for decisions are not obtainable. Use of case studies and articles to examine why many cost systems are unsatisfactory, what the symptoms of cost system failure are, and how appropriately to structure an improved system. 3 units. *Staff*

433. Management Planning and Control. The aim in this course is more effective use of information in management, through, for example, statistical models for forecasting, probability models for control, and management science models for planning. The course also explores, from a more qualitative perspective, broad issues of control and performance evaluation in service industries, not-for-profit organizations, and multinational operations. 3 units. *Staff*

435. Management Information Systems. Examines the role of the Accounting Information System (AIS) in supporting the management control system and the strategic planning process within the organization. Specific attention is given to the problems of design and operation of the AIS, the role of information in planning and control, technologies of information systems, dynamics of information flows and the problem of fraud in the computer-based AIS. 3 units. *Staff*

436. Auditing. Examines the concepts and methods of auditing. Course content focuses primarily on what audits are (and are not), why they are done, and how they are done. Current regulatory, legal, and ethical issues are examined, as well as the value and limitations of financial and managerial accounting in business organizations. Relevant not only for those interested in professional auditing, but also for those who plan careers in business management and management consulting, particularly in accounting firms. 3 units. *Staff*

437. Financial Statement Analysis. Starts by describing a systematic approach to analyzing financial statements and to studying ratio analysis (over time and in cross-section), industry analysis, and cash flow analysis. Since these tools only indicate how firms have performed in the past, the course introduces tools to extrapolate past performance to the future: cash flow forecasts, firm valuation, and sensitivity analysis. The analysis of earnings quality is emphasized by examining various ways in which reporting options affect income, cash flows, financial ratios and trends. Applications such as credit analysis, growth analysis, corporate restructuring and international financial analysis are covered. 3 units. *Staff*

440. Corporate Strategy. This course focuses on the major phases of the strategic planning process within business organizations. Considerations involving the various functional areas of management are integrated to permit meaningful decisions concerning the product-market posture of the firm. Topics relevant to the design and implementation of strategic planning are explored within a number of different contexts: entrepreneurial, innovative, diversified, mature, and professional. 3 units. *Staff*

442. Entrepreneurship and New Venture Management. Provides an intensive, tutored field study of the formation of new business ventures. Students work in teams to develop market, strategic, operations, and financial aspects of original ideas toward completion of a full business plan. Entrepreneurs and new venture investors advise students on the progress of their work and evaluate final plans. 3 units. *Staff*

445. Business Planning. Presents corporate, security, and tax issues for analysis and resolution through examining a series of problems involving common business transactions. The problems will include such topics as the formation of closely-held and public corporations, stock redemption, the sale of a business, merger and other types of combination transactions, and recapitalization, division, and dissolution of corporations. 3 units. *Staff*

446. Federal Income Taxation. The course examines the Federal income tax system as it applies to corporations and partnerships. Selected topics include concepts of income and exclusions from income, deductible expenses, credits, property transactions, depreciation, depletion, nontaxable transactions, penalty taxes, distributions, redemptions, reorganizations, and liquidations, employee expenses and compensation programs, multistate taxation, and the taxation of international transactions. 3 units. *Staff*

447. Strategic Management for Health Services. (Capstone course for the HSM concentration) Considers the strategy and operation of the health service institution, especially hospitals, from a top-management view. A major focus is the integration of human resources, marketing, operations, finance, information systems, and quality of care issues from the corporate view. Special issues in ethics and culture are also considered. 3 units. *Staff*

448. Health Care Policy. Examines special aspects of health care law, financing, and health care policy. The provision of health care in the United States exists within a unique and complex environment. Local, state, and federal governments, through laws, programs, reimbursements, and payments, create a special environment for health care providers. More recently, corporations are taking active steps in modifying this environment. 3 units. *Staff*

449. Cultural Setting of Business. This course studies culture. The course defines culture and identifies the relevant dimensions to be used in the description of any of the many different cultures of the world. Two sets of dimensions are identified, those that differ by subject and those that differ by logical nature. The first constitutes the parts of the culture, e.g., religion, politics, business, etc. The second identifies the components of a culture, those things that define a culture and every part of it. These are the concepts of truth, the beliefs, the values, the logic, and the decision rules. A culture of a people may be described in terms of either set of dimensions. 3 units. *Staff*

450. Short-Run Financial Management. Examines the financial management and control of a firm's short-term assets and liabilities. Topics include cash management, collection and disbursement techniques, management of the firm's short-term investment/borrowing portfolio, cash forecasting, receivables management, and the management of the firm's bank relationships. 3 units. *Staff*

451. Advanced Corporate Finance. Examines in depth the major financial decisions faced by the firm. Topics include dividend policy and capital structure decisions of the firm, as well as the pricing of various financial instruments. While the major emphasis of the course is on the traditional and recent theories regarding corporate financial decision-making, much time is devoted to the consideration of empirical evidence supporting/refuting the various theoretical propositions. Time permitting, some special topics such as mergers and acquisitions and lease financing will be considered. 3 units. *Staff*

452. Money and Capital Markets. Considers the structure and behavior of capital markets. The course includes a discussion of the institutional framework of the American capital market as well as the major international markets, although the emphasis is on the theoretical foundation for analyzing interest rates and funds flow in those financial markets. Included among the topics is an extended discussion of monetary theory, the term structure of interest rates, and the analysis of risk in financial markets. 3 units. *Staff*

453. Investment Management. Focuses on the fundamentals of security valuation and portfolio selection in an informationally efficient and efficiently-functioning capital market. Topics covered include portfolio theory, risk and return in asset pricing, the role of arbitrage, and the measurement of portfolio performance, with emphasis being placed on the application of financial theory. The types of security markets discussed include stocks, bonds, financial futures and options. Both theory and empirical evidence are considered. Students are required to carry out homework exercises involving the use of microcomputer software. 3 units. *Staff*

454. Management of Financial Institutions. Develops a framework for understanding financial intermediation and its role of providing the conduit for the flow of funds through the economy. Considers the sources and uses of funds in the economy and how commercial banks and other financial institutions act as agent on behalf of both savers and users of funds. Examines the structure and operations of the Federal Reserve System and its effect on commercial banks. 3 units. *Staff*

455. Futures and Options Markets. Focuses on the use of futures and options contracts in the financial management of corporations and the management of security portfolios. In the futures area emphasis is placed on interest rate futures, currency futures, and stock index futures. General pricing of agricultural futures is also studied as well as the use of agricultural and other contracts in diversifying security portfolios. In the options area emphasis is placed on the use of stock options in the financial management of stock portfolios. Interest rate options and the use of option pricing models in the formulation of optimal option investment strategies are also studied. 3 units. *Staff*

456. Corporate Finance. Examines the implications of modern financial theory for various decisions faced by corporate financial officers. Topics include capital budgeting, capital structure, the cost of capital, dividend policy, mergers and acquisitions, option pricing, and international financial management. Theory, empirical evidence, and case analysis all play significant roles in the course. Theory and empirical evidence together yield implications for corporate financial decision making. Case analysis forces students to apply their knowledge of theory and evidence to real-world situations. 3 units. *Staff*

457. Corporate Restructuring. This course will focus on some of the important managerial problems associated with corporate restructuring, i.e., business ventures that are strategically important, particularly projects related to new expansion, acquisitions, management buyouts, leveraged buyouts, divestments, and recapitalization. Both financial and strategic tools and techniques will be emphasized. Specific financial topics included will be alternative economic criteria, interpretation of study results and their use in decision making, and strategic valuation. The point of the course is that strategically important decisions must be based on sound analyses of both the financial and the strategic implications of the decision. 3 units. *Staff*

458. Equity Markets: Trading and Market Making. Focuses on the structure and regulation of the equity markets, the operations of dealers and specialists, and the performance of the markets. The objective is to convey an understanding of how prices are determined in the marketplace. Particular attention is also given to how investor

trading strategies should take account of the costs of trading, liquidity, and the rules and protocols by which orders are handled and translated into trades. 3 units. *Staff*

459. Investment Banking. Develops a fundamental understanding of the many roles of investment banking firms in the capital marketplace. As financial intermediaries, investment banks originate, underwrite, and distribute new security issues, serving both their issuing clients and their investing customers. Investment bank services may also include advising clients, arranging lease financing, arbitraging profit opportunities, placing unregistered securities, and providing broker and dealer services. Topics include markets and market making, and syndication and underwriting. Corporate finance decisions pertaining to investment banks (e.g., mergers and tender offers) are also considered. 3 units. *Staff*

460. Advanced Marketing Strategy. Considers in greater depth the process of strategic planning in the marketing function and its relation to corporate strategy. Offers an opportunity to sharpen and extend analytical skills in marketing as well as to synthesize understanding of the managerial, organizational, and environmental aspects of marketing activity. 3 units. *Staff*

461. Marketing Research: Problem Formulation and Design. Focuses on understanding data relevant to marketing managers, the types available, experimental design, methods of collection and examination. Learn to define a research goal, create an effective measurement instrument (survey, focus group, store sample), and process the resulting information for subsequent analysis. Emphasizes how the marketing research process is carried out. 3 units. *Staff*

462. Consumer Behavior. Provides an opportunity for advanced study of the behavior of consumers. Objectives include (1) increasing the prospective manager's sensitivity to and understanding of consumers and the psychological, sociological, and anthropological forces which shape their behavior, and (2) enabling the student to apply this knowledge in arriving at improved marketing decisions. 3 units. *Staff*

463. Marketing Communications. Includes the management of advertising, promotions, public relations, and the other more subtle ways companies communicate with their customers. Objective is to provide an approach to management that is thoughtful, sophisticated, and state-of-the-art, while being practical and relevant to "real world" communications planning, decision making, and control. 3 units. *Staff*

464. Product Management. This course develops an understanding of the roles, activities, and responsibilities of the modern product manager. The classes consist of lectures, case discussions, group presentations, and "live cases" involving a current problem of an actual company. The cases are largely taken from package goods companies and from their advertising agencies, retailers, or wholesalers. In addition, students consider related cases involving the management of services or durables, such as airlines or automobiles. Throughout, students use the kinds of market research data, such as panel, survey, or test market data, that product managers use to understand the impact of their actions on markets. 3 units. *Staff*

465. Industrial Marketing. This course is designed to expand your ability to resolve problems and uncover opportunities in industrial markets. You will also be exposed to a number of current topics in industrial marketing, such as partnerships and the impact of total quality management. This course will focus on the areas of salesforce management, strategic market and product selection, pricing, and distribution policy. 3 units. *Staff*

466. Channel and Distribution System Management. Examines formulation and solution of problems involving strategies and decisions on the firm's relations with other elements that make up its different market environments. Decision problems on the

choice of forms and levels of cooperation and competition with other organizations are analyzed. The efficiency of different forms and structures of marketing channels and distribution systems is discussed and determined. Specific problems studied include: decisions on the allocation of marketing activities and resources; the coordination of activities and levels; the coordination and control of advertising, selling efforts, prices, etc. of sellers and resellers. Lectures, discussions, and cases. 3 units. *Staff*

467. Marketing of Services. Supplements the basic marketing and marketing strategy courses by focusing on problems and strategies in service businesses. Addresses problems encountered in services such as internal marketing, warranties, and assessing quality. Emphasizes services in general rather than any particular industry. Uses cases, examples, and exercises from a variety of industries such as banking, health care, financial planning, consulting, the professions, sports marketing, and communication. The course is designed for students with career interests in service industries as well as goods industries with high service components. 3 units. *Staff*

468. Analysis for Marketing Decisions. Emphasizes analysis of marketing research information as an aid to decision making. Topics to be covered include: conjoint, discriminant, and factor analysis, analysis of variance, and multidimensional scaling. Emphasis is on interpretation of results, rather than on the details of the algorithms. 3 units. *Staff*

469. International Marketing. Develops students' knowledge of theoretical concepts and practical aspects of marketing for firms competing in countries with different cultural, legal, economic, and political environments. Designed both for those who plan to work for multinational companies and those who want to enrich their knowledge of the international marketplace. 3 units. *Staff*

470. Operations Planning and Control. Focuses on tactical issues relevant to the management of material, labor, equipment, and inventories in production/distribution systems. Advanced models are formulated to structure the relationship between key decision variables and system performance in meeting customer delivery requirements while maintaining low costs and high quality. Particular emphasis is placed on control policies that effectively accommodate the fluctuations and uncertainties in both product demand and component supply that are typically encountered in real manufacturing environments. Topics include inventory management, aggregate production planning, master production scheduling, material requirements planning, shop floor controls, and just-in-time systems. 3 units. *Staff*

471. Manufacturing Strategy. Explores the use of manufacturing as a competitive weapon. The course investigates various frameworks for describing, analyzing, and assessing the strategic operations choices available to companies, with the goal of determining how a company's operations can contribute to competitive success, organizational learning, and world-class status. Among the strategic decision categories that will be examined are process and technology choices, facilities and capacity decisions, quality and productivity management, and performance measurement. 3 units. *Staff*

472. Service Operations Management. Explores the role of operations in service organizations by examining in depth the nature, design, and delivery of services. This course considers the strategic, tactical, and operational issues associated with the management of a broad range of service operations, such as transportation companies, professional services, financial services, restaurants, and health-care services. 3 units. *Staff*

473. Management of Technology. Examines the multiple impacts that technology has on the firm. Major issues of technology management will be discussed, including innovation, competitiveness, technology assessment, R & D strategy, positioning, manu-

facturing technologies, and productivity. These issues are encountered not only in the technology-based company, but in any organization. Also covered will be the incorporation of a new technology into an existing industry and the new entrepreneur-based companies that are formed to work with a technology. The course will focus primarily on management issues, using as models new technologies such as biotechnology, superconductivity, microelectronics, and fiberoptics. 3 units. *Staff*

474. Managing Innovative Production Systems. Examines how managers evaluate and implement changes in the firm's process technology. The course looks at both soft technologies, such as information systems, just-in-time control, and group technology, and the hard technologies, such as NC machines, robotics, flexible manufacturing systems and computer integrated manufacturing. The course focuses on how to manage the changes in the structure of the firm, and how to use these systems to alter the competitive position of the firm. 3 units. *Staff*

482A. International Investment Finance. 3 units. *Staff*

482B. International Corporate Finance. 3 units. *Staff*

483. Strategy, Management, and Organization Design of Global Corporations. The course focuses on the management challenges associated with the development of strategies and the management of organizations in business enterprises whose operations stretch across national boundaries. The course emphasizes the way transnational corporations are different from purely domestic companies. The course addresses the choices and tradeoff involved in understanding the strategic and organizational challenges of managing transnational companies in a complex, increasingly interdependent, turbulent international environment. 3 units. *Staff*

490. Practicum. Topics vary each semester offered. 3 units. *Staff*

491, 1-9. Special Topics in Management. Permits the study of special topics in management on an occasional basis depending on the availability and interests of students and faculty. Examples of special topics include project management, legal, and tax aspects of entrepreneurship, real estate finance, labor negotiations and arbitration, and knowledge management. 3 units. *Staff*

495. Health Services Management Orientation Seminar. The course begins with a look at the total health care system, continues with an examination of the overall organization and role of hospitals generally, and then proceeds to a series of visits and discussions with individuals in the Duke University Medical Center. There follows a series of sessions with chief executive officers of other kinds of hospitals, a hospital system, a hospital association, and a health insurance organization. It also includes discussions concerning the opportunities for a summer internship and with recent graduates to learn of their transition into the administrative work place. No credit. *McMahon*

496. Health Services Management Leadership Seminar. The course consists of a series of presentations by top leaders of health care institutions, leaders of multi-institutional systems, people involved in the financing and regulation of health care, and consultants to managers in health care organizations of all kinds. The course integrates what the student has learned of the analytical techniques in the core courses, in organizational behavior, strategic management, and in health policy. No credit. *McMahon*

498. Independent Study. Allows the student an opportunity to engage in a study of special topics on an individual basis under the supervision of a faculty member. Prerequisites: second-year standing in the Master of Business Administration program and consent of the Director of the M.B.A. Program and instructor. 3 units. *Staff*

499. Independent Study. Allows the student an opportunity to engage in a study of special topics on an individual basis under the supervision of a faculty member. Prerequisites: second-year standing in the Master of Business Administration program and consent of the Director of the M.B.A. Program and instructor. 3 units. *Staff*

Doctor of Philosophy

510. Bayesian Inference and Decision. Methods of Bayesian inference and statistical decision theory, with emphasis on the general approach of modeling inferential and decision-making problems as well as the development of specific procedures for certain classes of problems. Topics include subjective probability, Bayesian inference and prediction, natural-conjugate families of distributions, Bayesian analysis for various processes, Bayesian estimation and hypothesis testing, comparisons with classical methods, decision-making criteria, utility theory, value of information, and sequential decision making. C-L: Statistics 221. 3 units. *Winkler*

513. Choice Theory. This seminar deals with the topics of measurement theory, conjoint measurement, expected utility and subjective expected utility theory, multiattribute utility theory and recent advances in preference modeling (generalized nonlinear utility theories). The goal of this seminar is to equip students with tools so that they can use preference modeling in a wide variety of social science applications. C-L: Statistics 234. 3 units. *Staff*

521. Organization Seminar: A Micro Focus. Individual and small group behavior in organizations. Theories of motivation, decision making, interpersonal behavior, group processes, and leadership. A variety of research approaches and methods includes presentation of behavioral research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

522. Organization Seminar: A Macro Focus. The organization and the subunits which make up the organization. Theories of organization, structure, decentralization, divisionalization, functional area integration, task design, incentives and rewards, information systems, and decision rules are developed with an orientation toward their choice and design for high performance. Includes presentation of research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

525. Behavioral Decision Theory. Examines the development of research in individual and group decision behavior. Major emphasis is given to theoretical developments and empirical research, with a range of articles assigned for each topic. The basic topic areas include (1) decision problem structuring, (2) thinking about uncertainties, (3) risk taking, (4) dealing with conflicting values, and (5) combining individual judgments into a group decision. C-L: Psychology: Experimental 316, Psychology: Social and Health Sciences 316, and Statistics 231. 3 units. *Payne*

531. Financial Accounting Seminar. The nature of published financial statement information and its relationship with various economic variables. The list of related variables might include stock market data, bankruptcy filings, and the actions of various users of financial statement information, including management, investors, creditors, and regulators. The focus is on the current research methodologies and research efforts used to analyze the above relationships. A background in masters-level accounting and finance is assumed. 3 units. *Staff*

532. Management Accounting Seminar. Information systems and their use in facilitating management decision making and organizational control. Emphasis on the appropriate research methodologies and paradigms including information economics, decision theory, and organizational theory. Topics include budgeting, incentive systems/performance evaluation, variance investigation, and cost allocation. 3 units. *Staff*

551. Corporate Finance Seminar. Introduction to research areas in corporate finance. Emphasis on the research interests of the instructor, and one of the following topics to be explored in depth: capital budgeting, capital structure, mergers and acquisitions, international finance, and cash management. 3 units. *Staff*

552. Investment Seminar. Survey of research in the investment area and exploration in depth of one or more problems in which research is currently active. Emphasis determined by the instructor from one or more of the following areas: valuation of risky securities, capital asset pricing model and extensions, capital market efficiency, portfolio theory, options and warrants, investment management, and futures contracts. 3 units. *Staff*

553. Portfolio Theory and Asset Pricing. This course mathematically derives well-known results in portfolio theory and asset-pricing models in finance. Topics to be covered include: single-period mean-variance efficient portfolios and the CAPM; pareto optimal allocations; multiperiod and continuous-time optimal consumption and portfolio rules; intertemporal asset-pricing model; arbitrage pricing theory; the term structure of interest rates and inflation risk; allocational roles of futures and options; and pricing and hedging results. Basic mathematics background in calculus, statistics, matrix algebra, optimization and dynamic programming is required. 3 units. *Staff*

561. Seminar in Quantitative Research in Marketing. An overview of the quantitative techniques which are important in marketing research. Each model and technique will be examined in considerable detail so as to permit an understanding of its assumptions, structure, and usefulness. Topics covered will include the general data analysis techniques as well as models from advertising, new products, and pricing decisions. 3 units. *Staff*

562. Seminar in Consumer Behavior. Examines the development of research in consumer behavior. Major emphasis is given to theoretical developments and empirical research, with a range of articles assigned for each topic. Topics include motivation and personality, perceptual processes, information search, choice processes, attitudes and persuasion, learning, and influence in consumer choice. C-L: Psychology: Experimental 315 and Psychology: Social and Health Sciences 315. 3 units. *Bettman*

563. Marketing Models Seminar. The primary goals of this seminar are (a) to critically review the most current research in marketing and (b) to gain a better understanding of and ability to build one's own model. After taking this course, students should be able to understand the assumptions and mathematical development of the current quantitative work in marketing and to use this understanding to develop meaningful extensions. 3 units. *Staelin*

564. Experimental Design and Analysis Seminar. Examines issues in the design and analysis of experiments. Emphasis on analysis of variance (ANOVA), starting with the basic ANOVA model and examining multiple factor designs, blocking designs, nested models, within subject designs, repeated measure designs, and analysis of covariance. 3 units. *Edell*

571. Operations Strategy Seminar. Recent developments in the strategy of operations in both the manufacturing and service sectors. Topics include the focused factory concept, Japanese manufacturing philosophy, technological policy toward new process development and toward new product introduction, vertical integration, choice of capacity and location, industry analysis, and the impact of government regulation. Emphasis on the development of hypotheses about strategic topics and the empirical means by which they can be tested. 3 units. *Staff*

572. Seminar in Operational and Technological Tactics. Current issues in the day-to-day management of manufacturing and service delivery systems. Topics include

material requirements planning, capacity requirements planning, quality of work life projects, productivity measurement and enhancement, implementation of new product introductions and production process modifications, quality assurance, production planning and scheduling, and logistics. Concentration on the substance of recent developments, the generation and test of hypotheses about tactical issues, and the applicability of various optimization techniques to the advance of operation tactics. 3 units. *Staff*

591. Selected Topics in Business. Allows the doctoral student the opportunity to study special topics in management on an occasional basis depending on the availability and interests of students and faculty. 3 units. *Staff*

597. Dissertation Research. For students actively pursuing research on their dissertation. Credit to be arranged. Prerequisites: student must have passed the preliminary examination and have the consent of the director of the doctoral program and instructor. Variable credit. *Staff*

598. Independent Study. Allows the doctoral student the opportunity to engage in study or tutorial on special topics on an individual basis under the supervision of a faculty member. Credit to be arranged. Prerequisites: doctoral program standing and consent of the director of the doctoral program and instructor. Variable credit. *Staff*

599. Directed Research. Allows the doctoral student to engage in individual research projects under the supervision of a faculty member. Credit to be arranged. Prerequisites: doctoral program standing and consent of the director of the doctoral program and instructor. Variable credit. *Staff*



Faculty



Faculty

The faculty of the Fuqua School of Business has developed a national reputation for both high quality teaching and research. One of the unique characteristics of this faculty is its diverse set of interests and professional backgrounds. Often an individual faculty member's interests will span two or three different areas of expertise. This diversity of interests ensures that the students will be exposed to wide-ranging views of the environment in which they will live and work after completing their educational experience.

The student-faculty ratio in the school is maintained at a level permitting development of close professional relationships and encouraging individual assistance in academic and professional relationships. Activities are planned which maximize student-faculty interaction. Some of these are career-related while others are more involved with research and teaching activities.

A brief description of the background and main areas of interest of the faculty follows:

Yair Aharoni, D.B.A., *J. Paul Sticht Visiting Professor of International Business*; B.A., M.A. (Tel Aviv University); D.B.A. (Harvard University).

Professor Aharoni is the Issachar Haimovic Professor (Emeritus) of Business Policy at Tel Aviv University. He has held appointments as visiting professor at Columbia, Stanford, Berkeley, and Boston University. He is the author of more than twenty-five books and monographs, more than seventy papers and book chapters, and over one hundred cases. His teaching and research interests lie in the areas of business policy and strategy, business and environment, international business, and comparative management. He serves on the editorial boards of *International Studies in Management* and *Journal of International Business Studies*, and is an associate editor of *Management Science* and *Organizational Science*, and is a Fellow of the Academy of International Business and the International Academy of Management.

James J. Anton, Ph.D., *Associate Professor of Business Administration*; B.S. (Emory University), Ph.D. (Stanford University).

Professor Anton is working on issues in technology adoption, procurement contracting, regulatory economics, and incentives. His teaching interests include microeconomics, macroeconomics, and industrial organization.

Alison H. Ashton, Ph.D., *Associate Professor of Business Administration*; B.S. (Louisiana State University), M.P.A., Ph.D. (The University of Texas at Austin).

Professor Ashton's academic interests are in behavioral decision theory and accounting. Her published research includes studies of auditors as decision makers, as well as managers as users of accounting information. Her current research focuses on other professional decision makers, including financial analysts and health care professionals. She has taught at New York University, the University of Texas at Austin, and the University of Alberta.

Robert H. Ashton, Ph.D., CPA, *T. Austin Finch, Sr. Professor of Business Administration, Area Coordinator for Accounting; and Director of the Accounting Research Center*; B.S. (Middle Tennessee State University), M.B.A. (Florida State University), Ph.D. (University of Minnesota).

Prior to joining the Duke faculty, Professor Ashton was on the faculties of New York University and the University of Texas at Austin, and he held a visiting position as the Winspear Foundation Professor at the University of Alberta. His principal research interests involve behavioral decision theory, especially as it relates to accounting and auditing issues. He also does research on the effectiveness and efficiency of external audits and other topics. He has published a book, a monograph, and numerous articles in leading journals. He serves on various editorial boards.

Helmy H. Baligh, Ph.D., *Professor of Business Administration*; B.A. (Oxford University), M.B.A., Ph.D. (University of California, Berkeley).

Professor Baligh joined the Duke faculty after teaching at the University of Illinois. His major research is in the analysis and design of economic structures for both business and social purposes. He has participated in the development of the Master of Business Administration programs at Duke and at the University of Illinois with emphasis on curriculum. His publications include *Vertical Market Structures* (with Leon E. Richartz) and several articles in the areas of transportation, hospital administration, marketing, economics, culture, and organization structure design. He teaches in the fields of marketing, economic decision making, organization design, and the cultural setting of business.

Ravi Bansal, Ph.D., *Associate Professor of Business Administration*; B.A., M.A. (University of Delhi), Ph.D. (Carnegie Mellon University).

Professor Bansal's interests are in financial economics, macroeconomics, time series analysis, and macroeconomics. The focus of his research is constructing and testing theories of asset price movements. His research is published in leading journals like the *Journal of Finance* and the *Journal of Econometrics*. He teaches courses in aggregate economics and financial economics.

Maura A. Belliveau, *Assistant Professor of Business Administration*; B.A. (Mount Holyoke College), M.S., Ph.D. (University of California at Berkeley).

Professor Belliveau's research addresses procedural fairness in organizations. Her recent work examines how human resource policy implementation, procedural fairness judgments, and career outcomes influence employee attitudes toward affirmative action. Her papers on procedural dimensions of negotiator effectiveness and social determinants of CEO compensation have been presented at the annual meetings of the Academy of Management.

Messod Daniel Beneish, Ph.D., *Associate Professor of Business Administration*; B.Comm. (Ecole Supérieure de Commerce de Reims), M.B.A., Ph.D. (University of Chicago).

Professor Beneish's teaching interests are in the area of financial accounting with a particular emphasis on the analysis of financial statements. His research investigates incentives, regulation, and capital markets. His current work focuses on agency problems between borrowers and lenders and on the detection of earnings manipulation.

James R. Bettman, Ph.D., *Burlington Industries Professor of Business Administration, Director of the Ph.D. Program*; B.A., M.Phil., Ph.D. (Yale University).

Prior to joining the Fuqua School of Business, Professor Bettman taught at the Graduate School of Management, University of California, Los Angeles. He is the author of *An Information Processing Theory of Consumer Choice* and *The Adaptive Decision Maker* as well as numerous articles in academic journals. Professor Bettman has served as a consultant to government agencies, as a member of editorial boards of scholarly publications, as a participant in numerous forums, and as coeditor of the *Journal of Consumer*

Research. His teaching interests are in consumer behavior and quantitative methods; his current research focuses on adaptive decision making and consumer behavior.

Preston C. Bottger, Ph.D., *Associate Professor of the Practice of Management*; B.E. (Hons), M.E., Ph.D. (University of New South Wales).

Professor Bottger is executive director of the Hartman Center for Midsized Company Management. He specializes in helping individuals and companies develop the capacities for strategy formulation and implementation. He is formerly of the Australian Graduate School of Management, University of New South Wales. There he was founding director of the Graduate Management Qualification, an M.B.A. course for engineers and scientists. He is the lead author of *Managing People* and has published many scientific articles on decision making, leadership, and motivation. Professor Bottger is on the editorial board of *Asia Pacific HRM*.

William F. Boulding, Ph.D., *Associate Professor of Business Administration*; B.A. (Swarthmore College), Ph.D. (University of Pennsylvania).

Professor Boulding is interested in model building relevant to managerial decision making. His current work focuses on the efficiency of various strategic options available to the firm. His teaching interests lie in the areas of marketing strategy and marketing management.

Douglas T. Breeden, Ph.D., *Research Professor of Finance*; S.B. (M.I.T.), M.A., Ph.D. (Stanford University).

Prior to joining the Fuqua School of Business faculty, Professor Breeden taught at Stanford University, the University of Chicago, and M.I.T. Professor Breeden's teaching and research interests are in the area of banking, investments, futures, and options. He has published in the major finance journals and is associate editor of the *Journal of Finance*, and editor of the *Journal of Fixed Income*.

Peter J. Brews, Ph.D., *Assistant Professor of Business Administration*; B. Comm., LL.B., H.Dip. (Company Law), (University of the Witwatersrand, Johannesburg), M.S.I.A. (Purdue University), Ph.D., (University of the Witwatersrand, Johannesburg).

Professor Brews teaches in the areas of strategic management and international business. His current research focuses on strategy formation in unstable environments. His early work investigated the challenges of achieving corporate growth through merger or acquisition. He consults internationally, assisting in firm level strategy formation processes, or designing and implementing management development programs for high potential employees of client firms, in the fields of international business, strategic management, and/or corporate finance.

Susan E. Brodt, Ph.D., *Assistant Professor of Business Administration*; A.B. (University of California, Berkeley), M.S., Ph.D. (Stanford University).

Professor Brodt's research concerns social perception and management decision behavior with specific emphasis on cognitive and social psychological processes involved in interpersonal conflict, negotiation, and human resource management decision making. She teaches courses in organizational behavior, conflict and cooperation, and negotiation.

Richard M. Burton, D.B.A., *Professor of Business Administration*; B.S., M.B.A., D.B.A. (University of Illinois).

Professor Burton's primary research interests are in the strategy, design, and management of organizations. He is currently developing the application of expert systems to organizational design. He teaches courses in organization design and management of professional service organizations. He is the program director for the Health Services Management Program at Fuqua and a departmental editor for *Management Science*.

Gerard Cachon, Ph.D., *Assistant Professor of Business Administration*; B.S., B.A.S., M.S., Ph.D. (University of Pennsylvania).

Professor Cachon's research interests are in operations management. He has current research projects in the areas of inventory management, supply chain coordination, logistics, and new product development. He teaches the core operations management course and an elective in supply chain management.

Ziv Carmon, Ph.D., *Assistant Professor of Business Administration*; B.Sc. (Technion, Israel Institute of Technology), M.S., Ph.D. (University of California at Berkeley).

Professor Carmon's research focuses on consumer decision making, on sales promotions, and on consumers' perceptions of the quality of products and services. He teaches the marketing management course.

Kalman J. Cohen, Ph.D., *Distinguished Bank Research Professor (Emeritus)*; B.A. (Reed College), M.Litt. (Oxford University), M.S., Ph.D. (Carnegie Institute of Technology).

Prior to joining the Duke faculty in 1974, Professor Cohen served for two years as Distinguished Professor of Finance and Economics and as the first director of the Salomon Brothers Center for the Study of Financial Institutions at New York University. He also spent fourteen years on the faculty of Carnegie Mellon University's Graduate School of Industrial Administration. He has written seven books and over eighty articles in the areas of banking and finance, strategic planning, economics, management science, and computer simulation. He has pioneered in the applications of management science techniques in banking. His current research focuses on the microstructure of security markets.

John Coleman, Ph.D., *Visiting Assistant Professor*; B.A. (University of Wisconsin), Ph.D. (University of Chicago).

Professor Coleman's interests are in macroeconomics, monetary and fiscal policy, financial economics, and methods for solving intertemporal general equilibrium models. The focus of his research is constructing and testing theories of real, monetary, and financial variables. He teaches courses in macro and monetary economics.

Francisco Delgado, Ph.D., *Assistant Professor of Business Administration*; B.S., (Catholic University, Lima), M.B.A., (Northern Illinois University), M.A., Ph.D., (University of Pennsylvania). On leave.

Professor Delgado's research involves international exchange rate and pricing problems, especially continuous time stochastic models and rational economic decisions in the presence of adjustment costs. He is currently working on transactions cost in financial markets. He teaches international finance, financial management, and futures and options.

Gerardine DeSanctis, Ph.D., *Professor of Business Administration*; B.A. (Villanova University), M.A. (Fairleigh Dickinson University), Ph.D. (Texas Tech University).

Professor DeSanctis' interests are in the general areas of organizational computing, computer supported cooperative work, and management of information systems. Her current work focuses on the design and impacts of electronic communication systems and groupware. She is studying the ways in which information technology enables change in how companies organize work tasks, enable communication, learn, and make decisions. Prior to moving to the Fuqua School of Business she was a professor of business administration at the University of Minnesota. She currently serves as senior editor of theory research for the *Management Information Systems Quarterly*, senior editor of organizational communication for *Organization Science*, and advisory board member for *Information Systems Research*.

Mark D. Dibner, Ph.D., *Adjunct Associate Professor of Business Administration*; B.A. (University of Pennsylvania), M.B.A. (Widener College), Ph.D. (Cornell University).

Professor Dibner received his B.A. in psychology and physiology, his M.B.A. in strategic planning, and his Ph.D. in neurobiology and behavior. He is currently on the staff of the North Carolina Biotechnology Center and was formerly employed by E.I. du Pont de Nemours & Co. in neurobiology research. His primary research interest is the biotechnology industry, and he teaches in the area of management of technology. He has written or edited six books on the U.S. and Japanese biotechnology industry, serves on four editorial boards, and is on the Board of Directors of the Association of Biotechnology Companies, the Council of Biotechnology Centers, and ESE Biosciences, Inc.

Bernard Dumas, Ph.D., *Research Professor of Business Administration*; B. Engineering (Ecole Centrale de Paris), M.S., Ph.D. (Columbia University).

Professor Dumas is also a professor of finance at the H.E.C. School of Management in France. Prior to joining the Fuqua School of Business faculty as research professor, he served as professor of finance at the Wharton School of the University of Pennsylvania. He has also been a visiting professor at Columbia University and at the University of California at Berkeley. He has published in the area of international finance. Professor Dumas has been an associate editor of *Journal of International Business Studies* and *Journal of Banking and Finance* and is currently an associate editor of *European Economic Review* and the *Review of Financial Studies*.

Julie A. Edell, Ph.D., *Associate Professor of Business Administration*; B.A. (University of Nebraska), M.S., Ph.D. (Carnegie Mellon University).

Professor Edell's teaching interests are in the area of marketing, with emphasis on advertising, marketing management, consumer behavior, and marketing research. Her current research is concerned with examining the effect of advertising communications upon consumer purchase behavior. Her work has appeared in the *Journal of Consumer Research* and *Journal of Marketing Research*.

Gregory W. Fischer, Ph.D., *Professor of Business Administration*; B.A., M.A., Ph.D. (University of Michigan).

Professor Fischer's research focuses on individual judgment and decision making and cognitive aspects of social behavior. His teaching interests are in managerial decision making, decision analysis, and managerial effectiveness.

John D. Forsyth, D.B.A., *Professor of Business Administration*; B.A. (Queen's University), M.B.A. (University of Detroit), D.B.A. (University of Illinois).

Prior to coming to Duke, Professor Forsyth was professor of business administration and director of the Program for Executive Development at IMEDE Management Development Institute in Lausanne, Switzerland. His teaching and research interests are in the areas of corporate finance and corporate strategy.

F. Douglas Foster, Ph.D., *Visiting Associate Professor for Business Administration*; B. Comm. (University of Alberta), M.S., Ph.D. (Cornell University).

Professor Foster is interested in financial intermediation, capital market theory, and international finance. His current research is in investment banking, the microfoundations of trading and corporate control. He teaches investment banking and international finance.

Eric J. Friedman, Ph.D., *Assistant Professor of Business Administration*; A.B. (Princeton University), M.A., M.S., Ph.D. (University of California at Berkeley).

Professor Friedman's teaching interests lie in the areas of statistics and management science. His research focuses on the application of game theory to problems in decentralized decision making and dynamic processes.

Katsumi Fujitani, L.L.M., *Adjunct Assistant Professor of Business Administration*; L.L.B. (Meiji University), L.L.M. (Meiji University School of Law).

Professor Fujitani teaches in the area of Japanese and Japanese business culture. His teaching and research interests include international manufacturing and operations management in comparative sociology. Prior to coming to Duke, Professor Fujitani was on the faculty of Appalachian State University and worked for Ricoh in the international operation of legal and patent affairs. He is also teaching current topics in Japan at Duke's Trinity College.

Anil Gaba, Ph.D., *Visiting Associate Professor of Business Administration*; B.A. (St. Stephen's College, Delhi University), Ph.D. (Duke University).

Anil Gaba is associate professor of Decision Sciences at INSEAD, Fontainebleau, France. He teaches courses in applied statistics, decision analysis, and Bayesian analysis. His research interests are in decision theory, Bayesian statistics, and forecasting.

John P. Gallagher, Ph.D., *Associate Professor of the Practice of Business Computing*; B.A. (University of California, Berkeley), Ph.D. (University of California, Santa Barbara).

Professor Gallagher has extensive teaching experience in computer applications to education and problem solving. His research and teaching interests lie in the areas of computer application in support of managerial decision making, computer applications in marketing and sales, and instructional psychology.

Stephen F. Gray, *Assistant Professor of Business Administration*; B.Com., L.L.B. (Queensland), Ph.D. (Stanford).

Professor Gray's research interests include econometrics and asset pricing, in particular modeling nonlinearities in financial time series. His recent work has focused on the application of regime-switching models to domestic interest rates, and on modeling the effects of central bank intervention on interest rates, exchange rates, and derivative securities.

Campbell R. Harvey, Ph.D., *Associate Professor of Business Administration*; B.A. (University of Toronto), M.B.A. (York University, Toronto), Ph.D. (University of Chicago).

Professor Harvey's primary area of research is investments. His work focuses on asset pricing models that allow for expected returns and risks to change through time. His research investigates the link between the business cycle and changing risk. He has published in the *Journal of Political Economy*, *Journal of Finance*, *Review of Financial Studies*, and the *Journal of Financial Economics*. He teaches courses in financial management and investment analysis.

David A. Hsieh, Ph.D., *Professor of Business Administration and Area Coordinator for Economics*; B.S. (Yale University), Ph.D. (Massachusetts Institute of Technology).

Prior to joining the Fuqua School of Business, Professor Hsieh taught at the Graduate School of Business, University of Chicago for eight years. His primary area of research is nonlinear dynamics in economics and finance, with a particular emphasis on empirical applications in foreign exchange rates. He teaches international finance, international environments, and money and capital markets.

Joel C. Huber, Ph.D., *Professor of Business Administration*; B.A. (Princeton University), M.B.A., Ph.D. (University of Pennsylvania).

Professor Huber came to the Fuqua School from the Columbia University School of Business and the Krannert Graduate School of Management, Purdue University. His teaching interests include industrial marketing, product marketing, and corporate strategy. His current research has focused on the use of computer-based interviewing to assess consumer reactions to promotions, price differences, and external quality ratings.

John (Jack) S. Hughes, CPA, Ph.D., *Professor of Business Administration*; BSBA (Northeastern University), M.S. (University of Massachusetts, Ph.D. (Purdue University)

Professor Hughes has had faculty appointments at Western New England College, Dartmouth College, University of British Columbia, (Arthur Andersen Alumni Professor) and University of Minnesota (Curtis Carlson Chair in Accounting). He has taught courses in financial accounting, managerial accounting, and auditing. His research includes theoretical and empirical inquiries into a wide range of issues relating principally to financial control, incentive contracting, and capital markets. He has served as an associate editor for *The Accounting Review*, *Contemporary Accounting Research*, and the *Journal of Accounting and Economics*, and is presently editor-in-chief of the *Review of Accounting Studies*.

Simon Johnson, Ph.D., *Assistant Professor of Business Administration*, B.A. (University of Oxford); M.A. (University of Manchester), Ph.D. (Massachusetts Institute of Technology).

Professor Johnson studies economic reform in Eastern Europe and the former Soviet Union. Before coming to Duke, he was a junior scholar at the Academy for International and Area Studies and a fellow at the Russian Research Center at Harvard University. Professor Johnson teaches courses in economics and international business.

Toby Y. Kahr, Ph.D., *Adjunct Associate Professor of Business Administration*; B.S. (Columbia University), M.A., Ph.D. (University of Illinois).

Professor Kahr is associate vice-president and director of Duke University Human Resources. Before coming to Duke he served as director of personnel services at the University of Illinois and worked for Ford Motor Company in personnel administration. Professor Kahr teaches courses in human resources management and power in organizations.

Thomas F. Keller, Ph.D., CPA, *R. J. Reynolds Professor of Business Administration and Dean*; A.B. (Duke University), M.B.A., Ph.D. (University of Michigan).

Professor Keller specializes in accounting. His current research and teaching interests are principally in the areas of financial accounting and reporting. He has held several offices in the American Accounting Association, including editor of the *Accounting Review* (1972-75). He is the coauthor and coeditor of several books in financial accounting. During the summer and fall of 1975, under the auspices of a Fulbright grant, he lectured in Australia and the Far East on a variety of topics related to the development of accounting theory and standards. He is currently a director of the American Business Products, Inc., Cambridge Series Trust, Hatteras Income Securities, Inc., LADD Furniture, Inc., Mebane Packaging Co., Mentor Growth Trust, Monk-Austin, Inc., Nations Funds, Inc., North Carolina Center for World Languages and Cultures, Unisphere Southeast, Inc., and Wendy's International, Inc. He is a former director of the American Assembly of Collegiate Schools of Business, the national accrediting agency for business schools and is former chairman of the RTP World Trade Center. He has served as dean of the School of Business since 1974.

Jill G. Klein, Ph.D., *Visiting Assistant Professor of Marketing*; B.A. (University of South Florida), Ph.D. (University of Michigan).

Professor Klein is interested in understanding how consumers form impressions of products and how they weight product attributes when making purchasing decisions. She also conducts research on the effectiveness of political advertising. Her teaching interests include marketing research methods, consumer behavior, and advertising.

Panagiotis (Panos) Kouvelis, Ph.D., *Associate Professor of Business Administration*, B.S.M.E. (National Technical University of Athens), M.B.A., M.I.S.E. (University of Southern California), Ph.D. (Stanford University).

Professor Kouvelis is studying a broad range of problems including global operations management, marketing/manufacturing interfaces, design and planning issues of flexible manufacturing systems and electronic assembly lines, layout design, operating room scheduling in hospital environments, cyclic scheduling, product design and its interface with operations management decisions, and strategic aspects of quality management. Prior to moving to the Fuqua School of Business he was on the faculty of the management department at the University of Texas. Professor Kouvelis teaches courses in operations management, manufacturing strategy, and international operations management.

Albert (Pete) Kyle, Ph.D., *Associate Professor of Business Administration*; B.S. (Davidson College), B.A. (Merton College, Oxford University), Ph.D. (University of Chicago).

Professor Kyle teaches courses in corporate finance and information economics. Before coming to the Fuqua School, he taught at the University of California at Berkeley and the Woodrow Wilson School, Princeton University. His research interests are in the area of information economics with emphasis on the trading process and price information.

Dan J. Laughhunn, D.B.A., *Professor of Business Administration*; B.S., M.B.A., D.B.A. (University of Illinois).

Professor Laughhunn has served as a consultant to industry and universities on a variety of topics related to planning and budgeting. His teaching and research interests deal with the application of quantitative techniques to problems in production and finance. Professor Laughhunn also has been actively engaged in teaching executive development programs, both at Duke and at other universities.

Katherine N. Lemon, Ph.D., *Assistant Professor of Business Administration*; B.A. (Colorado College), M.B.A. (Wichita State University), Ph.D. (University of California, Berkeley).

Professor Lemon's primary area of research is customer retention. Her work focuses on determining the factors which influence a customer's decision to disadopt a product or service. She also has interests in consumer decision making and the marketing of private label products. Her teaching interests lie in the areas of marketing management, marketing research, and database marketing.

Arie Y. Lewin, Ph.D., *Professor of Business Administration*; B.S., M.S. (University of California, Los Angeles), M.S., Ph.D. (Carnegie Mellon University).

Professor Lewin's overall research interests involve the analysis of organizational effectiveness and the design of organizations. His current research involves the organization, design, and management of continuously improving learning organizations, the development and application of the data envelopment analysis methodology for evaluating organization effectiveness, and the implications of computer mediated communication technology for organizational decision making and design. He has served as director of the Decision, Risk, and Management Science Program and NSF and is founding editor-in-chief of *Organization Science*.

Wei Li, Ph.D., *Assistant Professor of Business Administration*; B.S. (Jiaotong University), Ph.D. (University of Michigan).

Professor Li studies economic reform in China, Eastern Europe, and the former Soviet Union. He also does research on the functioning of market and nonmarket institutions in economies characterized by inter-industry or inter-regional dependence. He teaches courses in economics and international business.

Patricia W. Linville, Ph.D., *Associate Professor of Business Administration*, B.A. (Florida Southern College), Ed.M. (Harvard University), Ph.D. (Duke University).

Prior to coming to Duke, Professor Linville was a faculty member in the Department of Psychology at Yale University. Her research area is social cognition, focusing on social judgment and decision making, stereotyping and intergroup relations, and negotiation.

John M. McCann, Ph.D., *Professor of Business Administration*; B.S.M.E., M.B.A. (University of Kentucky), Ph.D. (Purdue University).

Professor McCann has taught at Cornell, the University of California at Berkeley, and has been a visiting professor at the University of Oregon. He has worked as an engineer and as a managing consultant at Data Resources, Inc. He founded and directed the Marketing Workbench Laboratory, a large research center that pioneered the use of expert systems in marketing and merchandising, at the Fuqua School. His current teaching involves courses in managerial informatics, and his research involves the development of methods for generating insights from market data, along with the subsequent management of those insights.

Kevin F. McCardle, Ph.D., *Associate Professor of Business Administration*; B.S. (Marquette University), M.A., Ph.D. (University of California, Los Angeles).

Professor McCardle's teaching interests lie in the area of probability and statistics, quality control, and total quality management. His research involves sequential decision theory, game theory and its applications, and models of R&D.

J. Alexander McMahon, *Executive in Residence*; B.A. (Duke University), J.D. (Harvard University).

Before joining the Fuqua faculty, Mr. McMahon was chairman of the Department of Health Administration in the Duke Medical Center. He conducts two seminars in the Health Services Management Program, and advises students interested in careers in health services organizations. He was formerly chairman of the Board of Trustees of Duke University, president of the American Hospital Association, president of Blue Cross and Blue Shield of North Carolina, and professor of public law and government at the University of North Carolina, Chapel Hill.

Wesley A. Magat, Ph.D., *Professor of Business Administration, Senior Associate Dean for Academic Programs, and Director of the Center for the Study of Business, Regulation, and Economic Policy*; A.B. (Brown University), M.S., Ph.D. (Northwestern University).

Professor Magat teaches primarily in the fields of managerial economics and regulatory management. He is currently involved in research in the areas of environmental, risk, and information regulation. He is the author or coauthor of four books, and his papers have appeared in numerous academic journals.

Laureen A. Maines, Ph.D., *Associate Professor of Business Administration*; B.S., M.B.A. (Indiana University) M.B.A., Ph.D. (University of Chicago).

Professor Maines' research interests focus on the use of accounting information for decision making purposes. Her current research examines various aspects of consensus forecasts of accounting variables. Her teaching interests include both managerial and financial accounting. Professor Maines has taught accounting at Indiana University and the University of Chicago and was a small business consultant with Deloitte Haskins & Sells.

Joseph B. Mazzola, Ph.D., *Associate Professor of Business Administration and Area Coordinator for Operations Management*; B.S. (State University of New York at Stony Brook); M.A. (Wake Forest University); M.S., Ph.D. (Carnegie Mellon University).

Professor Mazzola's teaching and research interests are in the areas of production/operations management, management science, and operations research. His cur-

rent research involves topics arising in automated manufacturing, operations scheduling, production and inventory control, and mathematical programming. Prior to coming to Duke, Professor Mazzola served on the faculty of the University of North Carolina at Chapel Hill.

Marian Chapman Moore, Ph.D., *Associate Professor of Business Administration*; B.A. (College of William and Mary), M.S. (Virginia Commonwealth University), Ph.D. (University of California, Los Angeles).

Professor Moore's teaching interests include marketing strategy and planning, competitive analysis, and strategic relationships. Her current research activities are focused on understanding how managers learn about their competitors and factor that information into their own decision making, and on issues of advertising effectiveness.

Michael J. Moore, Ph.D., *Associate Professor of Business Administration*; B.S. (Boston College), M.B.A. (Babson College), M.S., Ph.D. (University of Michigan).

Professor Moore's research interests are primarily in the areas of health and safety regulation. He has published articles on workers' compensation insurance, environmental policy, occupational safety, alcohol control policy, and health policy in various economic journals. His first book, *Compensation Mechanisms for Job Risks: Wages, Workers' Compensation, and Product Liability*, was published in 1990. He is currently studying the effects of product liability risk on innovation decisions, product safety regulation, and alcohol abuse. His teaching interests are in applied microeconomics, and econometrics.

Purushottaman Nandakumar, Ph.D., *Assistant Professor of Business Administration*; B.Tech. (Indian Institute of Technology); M.B.A. (Indian Institute of Management); M.S., Ph.D. (Carnegie Mellon University).

Professors Nandakumar's research interests are in operations management. His current research portfolio includes projects in the areas of inventory management and process improvements in manufacturing systems. Professor Nandakumar teaches the core operations management course and an elective in productivity improvement and process learning.

Robert F. Nau, Ph.D., *Associate Professor of Business Administration and Area Coordinator for Decision Sciences*; B.A. (University of California at San Diego), M.S., Ph.D. (University of California at Berkeley).

Professor Nau's research interests include the mathematical foundations of decision theory and game theory and their applications in economics and finance. Prior to coming to the Fuqua School, Professor Nau taught at Tulane University and served as manager of information systems at Liberty Mutual Insurance Company. He has taught courses in management science, computers and information systems, and statistical forecasting.

Pierre C. Ndilikilikesha, Ph.D., *Assistant Professor of Business Administration*; B.S., M.S. (Odessa State University), Ph.D. (University of Kansas).

Professor Ndilikilikesha's research interests lie at the interface between management science, decision analysis, and artificial intelligence. He is currently working on influence diagrams and their applications in expert systems design. His teaching interests include management science, decision analysis, and expert systems.

Gwen Ortmeier, Ph.D., *Associate Professor of the Practice of Business Administration*, B.S. (University of California at Berkeley), Ph.D. (Stanford University).

Professor Ortmeier's teaching interests include marketing strategy and planning, competitive analysis, and retailing. Prior to coming to the Fuqua School, she taught at Columbia's Graduate School of Business and the Harvard Business School. She is active in executive education and consulting to a variety of organizations. Professor Ort-

meyer's research activities focus on retailing issues such as channel partnerships and retail pricing strategy.

John W. Payne, Ph.D., *Joseph J. Ruvane, Jr. Professor of Business Administration, Area Coordinator for Management and Director of the Center for Decision Studies; B.A., M.A., Ph.D. (University of California, Irvine).*

Prior to coming to Duke, Professor Payne was on the faculty of the Graduate School of Business at the University of Chicago. His primary research activities deal with individual decision behavior. He has investigated decision making under risk, consumer choice behavior, and the design of computer-based support systems. He teaches courses in decision theory, organizational behavior, and consumer behavior.

Robert M. Price, Executive in Residence; B.S. (Duke University), M.S. (Georgia Institute of Technology).

Mr. Price is president of PSV, Inc., a management consulting firm specializing in assistance to start up companies and to improving the utilization and commercialization of technology. He is the retired chairman of the board and chief executive officer of Control Data Corporation, Minneapolis, Minnesota. Currently Mr. Price is involved in quality, U.S. technology policy, and educational issues. He is on the boards of directors of several firms and is fellow of the International Academy of Management and a member of the board of the Center for International Leadership. He is also chairman of the board of the Alpha Center for Social Entrepreneurs.

Devavrat Purohit, Ph.D., *Associate Professor of Business Administration; B.A. (Muskingum College), M.B.A., Ph.D. (Carnegie Mellon University).*

Professor Purohit's teaching interests are marketing management, product and pricing management, and marketing research. His research interests are new product development and obsolescence, pricing, consumer perceptions of product changes, and trade-in and rebate policies.

Robert E. Reinheimer, Ph.D., *Professor of the Practice of Management Communication; B.A., M.A. (California State University, Fullerton), Ph.D. (University of Kansas).*

Professor Reinheimer came to the Fuqua School from the University of Virginia. His primary areas of interest are negotiation, persuasion strategy, task group effectiveness, and communication. He has taught a number of courses and executive development programs in these areas, and was responsible for the development of the management communication courses in the M.B.A. and Executive M.B.A. programs.

Mark C. Rogers, Adjunct Professor of Business Administration; B.A. (Columbia University), M.D. (State University of New York), M.B.A. (University of Pennsylvania).

Dr. Rogers is vice-chancellor for Health Affairs of Duke University Medical Center and executive director and chief executive officer of Duke Hospital. Prior to coming to Duke, he was at The Johns Hopkins Hospital, where he was director of the Pediatric Intensive Care Unit, professor of pediatrics, Distinguished Faculty Professor, and chairman of the Department of Anesthesiology and Critical Care Medicine, as well as associate dean for Clinical Practice. His teaching interests at the Fuqua School involve strategic management for health services.

Jeffrey L. Rummel, Ph.D., *Associate Professor of Business Administration; B.A. (Capital University), M.S., Ph.D. (University of Rochester).*

Professor Rummel's teaching and research interests are in the areas of manufacturing and operations management, management science, and mathematical programming. He has published in *Management Science* and the *Journal of Manufacturing and Operations Management*. Current research projects include work on cost and per-

formance measurement in batch manufacturing, automated scheduling systems, and lot sizing and release planning for manufacturing.

Jane E. Salk, Ph.D., *Assistant Professor of Business Administration*; B.A. (University of Chicago), M.A. (University of North Carolina), Ph.D. (Massachusetts Institute of Technology).

Professor Salk's current research encompasses the sociological and group development aspects of international shared management joint venture teams. She has also done work on mergers and acquisitions and has done clinical research in West German businesses. In 1989-90 she was a Fulbright Scholar at the University of Cologne and has also received recognition and support by Marketing Science Institute and as a Kenan Fellow.

William A. Sax, *Executive in Residence*; B.S. (St. Louis University).

Mr. Sax teaches strategic business planning for midsize business and consulting for small business. He worked for thirty-six years in the oil industry, the last thirty-one years with Unocal Corporation (formerly Union Oil Company of California) where he was vice-president of international oil and gas exploration.

James E. Sheldon, L.L.M. *Adjunct Assistant Professor of Business Administration*; B.A. (Dartmouth College), J.D. (University of California), L.L.M. (Boston University Law School), L.L.M. (University of Stockholm).

Before joining the Fuqua School of Business, Mr. Sheldon practiced corporate, securities, and tax law for seven years in Boston and San Francisco. His teaching and research interests include business and tax planning. He is a principal of the Synertech Group, a new venture development firm, and is a member of the California, Massachusetts, and North Carolina Bar Associations.

Blair H. Sheppard, Ph.D., *Professor of Business Administration and Associate Dean for Executive Education*; B.A., M.A. (University of Western Ontario), Ph.D. (University of Illinois).

Professor Sheppard teaches in the area of organizational behavior. His interests generally relate to the broad topic of managing relationships with organizations. Specific research interests include conflict management, motivation, justice, negotiation, group performance, and employee attitudes. He has published articles on all of these topics in a range of business and psychology journals and is coeditor of an annual series entitled "Research on Negotiation in Organizations." His professional activities include executive education and consulting for a variety of organizations and active participation in professional associations.

Sim B. Sitkin, Ph.D., *Associate Professor of Business Administration*; A.B. (Clark University), Ed.M. (Harvard University), Ph.D., (Stanford University).

Professor Sitkin's research focuses on the effect of formal and informal organizational control systems on risk taking, accountability, trust, learning, and innovation. His teaching interests include organizational behavior, organizational control, and the management of organizational change. His co-edited book, *The Legalistic Organization*, was published in 1994. He currently serves on the editorial boards of *Academy of Management Review* and *Organization Science*. His consulting and executive development work has included a number of large and small corporations in the office equipment, transportation, publishing, and hospitality industries.

Charles J. Skender, M.B.A., CPA, *Visiting Assistant Professor of Business Administration*; B.S. (Lehigh University), M.B.A. (Duke University).

Professor Skender has attained nine professional designations in accounting, financial planning, insurance, and management. He has served as a training consultant to Wells Fargo Bank and IBM. He previously worked on the audit staff of Deloitte Haskins & Sells. Professor Skender has received teacher awards at Fuqua and at North Carolina State University, where he is a member of the Golden Chain. He has published in *TAXES*.

Frank A. Sloan, Ph.D., *J. Alexander McMahon Professor of Health Policy and Management; B.A. (Oberlin College), Ph.D. (Harvard University).*

Prior to coming to Duke, Professor Sloan was a member of the faculty of the economics department at Vanderbilt University. His primary research interest is health economics. He has studied many facets of medical malpractice, hospitals, physicians' services, families' decisions about long-term care, and pharmaceuticals. Recently he has written several papers on drinking and driving.

Paula R. Sloan, Adjunct Associate Professor, B.A. (City University of New York), M.A.T. (Harvard University), M.S. (University of California at Los Angeles).

Professor Sloan is known for her development of programs to help adults overcome math anxiety, and for her development of academic support programs for mid-career business people returning to academe. Prior to coming to Duke, she served on the faculty of The Owen Graduate School of Management at Vanderbilt University.

James E. Smith, Ph.D., Associate Professor of Business Administration; B.S., M.S., Ph.D. (Stanford University).

Professor Smith's research interests are primarily in the area of probabilistic modeling and decision analysis, focusing on tools and methods for representing decision problems and techniques for valuing risky projects. At Fuqua, Professor Smith teaches courses in probability, statistics, and decision analysis.

Thomas M. Smith, Ph.D., Associate Professor of Business Administration; B.Comm., M.F.M. (University of Queensland), Ph.D. (Stanford University).

Professor Smith teaches courses in financial management, asset pricing, and empirical methodology in finance. Before coming to the Fuqua School he taught at the University of Queensland and Brisbane College of Advanced Education in Australia. His research interests are asset pricing theory and tests.

Harris Sondak, Ph.D., Associate Professor of Business Administration; B.A. (University of Colorado); M.S., Ph.D. (Northwestern University).

Professor Sondak teaches negotiations and business ethics courses. His research investigates allocation procedures and decisions in various contexts including two-party and multi-party negotiations. His research has been published in *Negotiation Journal*, *Group Decision and Negotiation*, *Organizational Behavior and Human Decision Processes*, and *Research on Negotiation in Organizations*.

Richard Staelin, Ph.D., Edward and Rose Donnell Professor of Business Administration and Area Coordinator for Marketing; B.S., M.B.A., Ph.D. (University of Michigan).

Prior to joining Duke's faculty, Professor Staelin served as professor and associate dean at the Graduate School of Industrial Administration, Carnegie Mellon University. He was also a visiting professor at the Australian Graduate School of Management and at the University of Chicago. His professional activities include consulting work for both the public and private sectors, executive director of Marketing Science Institute, and publication of a book and over fifty journal articles. He was Fuqua's associate dean for faculty for eight years and is currently the editor of *Marketing Science*. Professor Staelin's current research interests include information search, channel management, and strategy formulation.

James H. Vander Weide, Ph.D., Research Professor of Business Administration; B.S. (Cornell University), Ph.D. (Northwestern University).

Professor Vander Weide's primary research and teaching interests are in the areas of corporate finance and managerial economics. He has written papers on topics such as cash management, capital budgeting, portfolio analysis, and the economic effects of government regulation. He has also served as a consultant to banks in the area of cash management. He has testified as an expert witness on the cost of capital before the Public Utility Commission of several states.

Nikolaos Vettas, Ph.D., *Assistant Professor of Business Administration*; B.A. (University of Athens), M.A., Ph.D. (University of Pennsylvania).

Professor Vettas teaches courses in microeconomics, managerial economics, and competitive analysis and strategy. His research interests are in the areas of industrial organization, information and learning, and international trade. His current work focuses on innovations and industry dynamics under uncertainty.

S. Viswanathan, Ph.D., *Associate Professor of Business Administration*; B.S., M.M.S. (University of Bombay), Ph.D. (Northwestern University).

Professor Viswanathan teaches corporate finance. His major research interests are corporate finance, market microstructure, and nonlinear asset pricing. His prior research has focused on the relationship between volume and volatility on the stock exchange and has been published in the *Journal of Business*, *Journal of Finance* and *Review of Financial Studies*. Currently, he is working on a study of foreign stock exchanges.

Wanda T. Wallace, Ph.D., *Associate Professor of Business Administration*; B.A., M.A.T., Ph.D. (Duke University).

Professor Wallace's general research interests involve consumer memory of advertising and products. Specifically, she is examining the effect of music on consumer memory for an advertisement and on emotional reaction to an advertisement. Her teaching interests include marketing management, consumer behavior, marketing of services, and team development.

Klaus Wertenbroch, Ph.D., *Assistant Professor of Business Administration*; B.A. (University of Mainz), M.A. (University of Darmstadt), M.B.A., Ph.D. (University of Chicago).

Professor Wertenbroch's research interests focus on behavioral and marketing decision making and preference inconsistencies. He is currently examining consumer self-control and its implications for the marketing of packaged goods. His teaching interests include international marketing, consumer behavior, and marketing management.

Robert E. Whaley, Ph.D., *T. Austin Finch Foundation Professor of Business Administration, Director of the Futures and Options Research Center, and Area Coordinator for Finance*; B. Comm. (University of Alberta), M.B.A., Ph.D. (University of Toronto).

Prior to joining the Fuqua School of Business faculty, Professor Whaley taught at Vanderbilt University, the University of Alberta, and the University of Chicago. He also served as vice president-research GNP Consulting in Chicago and as director of the Institute for Financial Research at the University of Alberta. Professor Whaley's research interests are currently in the area of market volatility, financial futures and options, and market microstructure. He has published numerous articles in finance, business, and accounting journals, has published six books, including a textbook on the theory and applications of futures and option contracts, is coeditor of the *Review of Futures Markets*, and is associate editor for *Advances in Futures and Options Research*, *Journal of Derivatives*, *Journal of Financial Economics*, and *Journal of Finance*.

Andrew B. Widmark, J.D., *Professor of the Practice of Real Estate*; B.S. (Fairleigh Dickinson University), M.B.A. (University of Pennsylvania), J.D. (Rutgers University).

Mr. Widmark teaches a course in fundamentals of real estate and a course in urban revitalization. He is president of Mark Realty Corp. which owns and manages shopping centers and office buildings throughout nine states. He previously practiced law in New Jersey and has taught estate planning courses at the Rutgers University School of Law.

Peter R. Wilson, Ph.D., *Associate Professor of the Practice of Business Administration*; B.A. (University of North Carolina at Chapel Hill); M.B.A. (University of North Carolina at Greensboro); Ph.D. (University of North Carolina at Chapel Hill).

Professor Wilson teaches in the areas of financial accounting and financial statement analysis. His research interests are in behavioral decision theory, auditor decision making, and the use and interpretation of financial statement information. His current research includes examining the effect of auditors' risk preferences on their decision behavior and studying the way in which analysts make use of financial information. His work has been featured in the *Wall Street Journal*. Prior to coming to Duke, Professor Wilson served on the faculty of the Stern School of Business at New York University.

Robert L. Winkler, Ph.D., *James B. Duke Professor of Business Administration and Senior Associate Dean for Faculty and Research*; B.S. (University of Illinois), Ph.D. (University of Chicago).

Prior to joining the Duke faculty, Professor Winkler served as Distinguished Professor of Quantitative Business Analysis at Indiana University, and he has held visiting positions at the University of Washington, the International Institute for Applied Systems Analysis, Stanford University, and INSEAD. His primary research interests involve Bayesian statistics, decision analysis, risk assessment, and probability forecasting. Professor Winkler is the author of numerous research articles and books and serves on the editorial boards of several journals.

William L. Yaeger, J.D., *Adjunct Associate Professor of Business Administration*; B.A. (Duke University), J.D. (Emory University).

Mr. Yaeger teaches the course Legal Environment of the Firm in the M.B.A. programs. He is in private practice in Durham, North Carolina, with an emphasis on bankruptcy and insolvency. Mr. Yaeger is a member of the North Carolina Bar Association and the National Association of Bankruptcy Trustees.



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1995-96

Undergraduate Instruction



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1995-96

Undergraduate Instruction

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The Bulletin of Duke University, Volume 67, includes the following titles: *The Fuqua School of Business*; *The School of the Environment*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *Information for Graduate Studies*; *Summer Session*; *Graduate Program in Nursing*; *The School of Law*; and *Information and Regulations*.

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University Calendar—1995-96

Summer 1995*

March	
29	Wednesday—Registration begins for Term I and/or Term II
May	
10	Wednesday—Last day for registration and payment of Term I fees without \$25 late fee (before 4:00 P.M.)
18	Thursday—Term I classes begin
22	Monday—Drop/Add for Term I ends
June	
23	Friday—Last day for registration and payment of Term II fees without \$25 late fee (before 4:00 P.M.)
26	Monday—Term I classes end
27	Tuesday—Reading period
28	Wednesday—Term I final examinations begin
29	Thursday—Term I final examinations end
July	
3	Monday—Term II classes begin
5	Wednesday—Drop/Add for Term II ends
August	
9	Wednesday—Term II classes end
10	Thursday—Reading period
11	Friday—Term II final examinations begin
12	Saturday—Term II final examinations end

Fall 1995

August	
23	Wednesday—Orientation begins; assemblies for all new undergraduate students
28	Monday, 8:00 A.M.—Fall semester classes begin
September	
4	Monday—Labor Day, classes in session
8	Friday—Drop/Add ends
29-30	Friday-Saturday—Parents' Weekend
October	
1	Sunday—Parents' Weekend continues
6-8	Friday-Sunday—Homecoming
13	Friday—Last day for reporting midsemester grades
13	Friday, 7:00 P.M.—Fall break begins
18	Wednesday, 8:00 A.M.—Classes resume
25	Wednesday—Registration begins for spring semester, 1996
November	
14	Tuesday—Registration ends for spring semester, 1996
15	Wednesday—Drop/Add begins
22	Wednesday, 12:40 P.M.—Thanksgiving recess begins
27	Monday, 8:00 A.M.—Classes resume
December	
7	Thursday, 7:00 P.M.—Fall semester classes end
8-10	Friday-Sunday—Reading period
10	Sunday—Founders' Day
11	Monday, 9:00 A.M.—Final examinations begin
16	Saturday, 10:00 P.M.—Final examinations end

*The School of the Environment, the Fuqua School of Business, the Marine Laboratory, the Graduate Nursing Program, and Physical Therapy may have different starting dates during the summer; consult the appropriate bulletins and schedules.

Spring 1996

January

- 10 Wednesday—Registration and matriculation of new undergraduate students
- 11 Thursday, 8:00 A.M.—Spring semester classes begin
- 24 Wednesday—Drop/Add ends

February

- 23 Friday—Last day for reporting midsemester grades

March

- 8 Friday, 7:00 P.M.—Spring recess begins
- 18 Monday, 8:00 A.M.—Classes resume
- 27 Wednesday—Registration begins for fall semester, 1996, and summer, 1996

April

- 11 Thursday—Registration ends for fall semester, 1996; summer registration continues
- 12 Friday—Drop/Add begins
- 24 Wednesday, 7:00 P.M.—Spring semester classes end
- 25-28 Thursday-Sunday—Reading period
- 29 Monday, 9:00 A.M.—Final examinations begin

May

- 4 Saturday, 10:00 P.M.—Final examinations end
- 10 Friday—Commencement begins
- 12 Sunday—Graduation exercises. Conferring of degrees



University Administration

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James A. Belvin, Jr., A.B., *Director of Undergraduate Financial Aid*

General Information



Duke University

In 1839 a group of citizens from Randolph and adjacent counties in North Carolina assembled in a log schoolhouse to organize support for a local academy founded a few months earlier by Brantley York. Prompted, they said, by "no small share of philanthropy and patriotism," they espoused their belief that "ignorance and error are the banes not only of religious but also civil society which rear up an almost impregnable wall between man and happiness." The Union Institute, which they then founded, was reorganized in 1851 as Normal College to train teachers, and again in 1859 as Trinity College, a liberal arts college, which later moved from the fields of Randolph County to the growing city of Durham, North Carolina. Trinity College was selected by James B. Duke as the major recipient of a fortune when, in 1924, he provided endowment funds for the university that would be organized around Trinity College and named for the Duke family.

The old Trinity College had, like almost all institutions in America at the time it was founded, been restricted to men. In 1896, Washington Duke gave an endowment with the condition that women be admitted "on equal footing with men." Thereafter, women were educated in Trinity College, and in 1930 the Woman's College was established as a separate college. Trinity College and the Woman's College continued as coordinate colleges for over forty years. To assure that women were indeed admitted "on equal footing with men," and to recognize that the education which men and women had received at Duke had long taken place in the same classrooms, the university merged these coordinate colleges in 1972 to form Trinity College of Arts and Sciences, the liberal arts undergraduate college of the university. The Bachelor of Arts and Bachelor of Science degrees may be earned in the college.

Instruction in engineering started at Normal College in 1851 and was continued at Trinity College as an option in the arts and sciences program. A Department of Engineering was established at Trinity in 1910. Following the establishment of Duke University in 1924, the Departments of Civil and Electrical Engineering were formed in 1927, and a Department of Mechanical Engineering was added four years later. The three engineering departments were joined to form the Division of Engineering as a separate administrative unit of the university. In 1939 this division was renamed the College of Engineering, which in 1966 became a professional school of engineering. The Division of Biomedical Engineering was added to the School of Engineering in 1967, and it was recognized as a department in 1971. In 1974 the name of the mechanical engineering department was changed to the Department of Mechanical Engineering and Materials Science; in 1982, the Department of Civil Engineering was renamed the Department of

Civil and Environmental Engineering. All four departments offer courses leading to Bachelor of Science in Engineering, Master of Science, and Doctor of Philosophy degrees.

The School of Nursing was established in 1931 in association with the School of Medicine and Duke Hospital. From 1944 until 1984, the Bachelor of Science in Nursing Education degree was offered. In 1980, the University Board of Trustees approved the phaseout of the existing undergraduate degree programs. At present, the School of Nursing offers courses leading to the Master of Science in Nursing degree, a program initiated in 1958.

As the university developed around the core of undergraduate colleges and schools, the Graduate School, organized in the 1920s, expanded in areas of instruction and research. It now consists of some fifty-five departments and programs and offers A.M., M.S., M.A.T., M.P.P., and Ph.D. degrees. In 1930, the School of Law of Trinity College was established as a graduate professional school, the Duke University School of Law, and was followed by other professional schools. The Divinity School was organized in 1926 and the School of Medicine in 1930. The School of Forestry which began in 1938 grew into the School of Forestry and Environmental Studies in 1974, and was restructured to become the School of the Environment in 1991. The Graduate School of Business Administration was established in 1969 and renamed the Fuqua School of Business in 1980.

Duke, a privately supported, church-related (Methodist) university, has over 10,000 students enrolled in degree programs. These students represent nearly every state and many foreign countries; Duke has more than 85,000 alumni in all fifty states and in numerous foreign countries. The university is a member of the North Carolina Association of Independent Colleges and Universities, the Southern Association of Colleges and Schools, and the Association of American Universities.

From academy to university, some of the basic principles have remained constant. The Duke University motto, *Eruditio et Religio*, reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students, the objective has been to encourage individuals to achieve, to the extent of their capacities, an understanding and appreciation of the world in which they live, their relationship to it, their opportunities, and their responsibilities.

Resources of the University

The Faculty. The university faculty, numbering approximately 1,900, maintains a tradition of personal attention to students and devotion to research. Many members of the faculty have been cited for excellence in teaching and are elected to membership in the national societies which honor those best in scholarship and research. Leaders in their disciplines and their professional organizations, they are authors of significant books and articles. Members of the faculty also act as consultants to industry, government, and foundations. To honor its outstanding faculty, the university has established more than one hundred James B. Duke and other named professorships.

The Library System. The libraries of the university consist of the William R. Perkins Library and its seven branches on campus: Biology-Forestry, Chemistry, Lilly, Engineering, Music, Mathematics-Physics, Special Collections; the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort; and the independently administered libraries of Divinity, Law, Medicine, and Business (Fuqua). As of June 1994, these libraries contained over 4,300,000 volumes. The collection includes 10.9 million manuscripts, and over 2,000,000 public documents.

The William R. Perkins Library. The William R. Perkins Library, the main library of the university, houses books, journals, and online resources supporting the humanities and the social sciences, as well as a large collection of United States federal and state

documents and public documents of many European and Latin American countries. The library is a depository for U.S., North Carolina, and European Community documents. An international focus is evident throughout the library collections, reflecting the global and interdisciplinary directions of scholarship and teaching as well as the historical strengths of area programs at the university. Included are extensive research collections from and about South Asia, Latin America, Africa, Europe, Russia, and Poland, as well as the country's largest collection of Canadiana. The East Asian Collection offers resources in Japanese, Chinese, and Korean on a variety of topics, predominantly history, politics, literature, and language. The newspaper collection includes many eighteenth-century titles; strong holdings of nineteenth-century New England papers; and antebellum and Civil War papers from North Carolina, South Carolina, Virginia, and Georgia; as well as many European and Latin American papers.

The Special Collections Library holdings range from ancient papyri to records of modern advertising. They number more than 200,000 printed volumes and more than 10.9 million items in manuscript and archival collections. They support research in a wide variety of disciplines and programs, including African-American studies, anthropology, classics, economics, history, literature, political science, religion, sociology, and women's studies. Areas of particular strength in the collections include the history and culture of the American South, English and American literature, history of economic theory, British and American Methodism, and the history of modern advertising.

The Circulation/Reserves Department houses the required reading materials placed on reserve for most graduate and undergraduate courses. The department is phasing in campus online access to reserve readings. The Lilly Library houses the university's principal collections of the visual arts and art history, drama, and philosophy. The Lilly Library is also the location of the Paul B. Williams Multimedia Broadcast Center. This state-of-the-art facility features remote transmission facilities for the campus as well as the film and videocassette collection. The branch libraries serve the academic disciplines bearing their names, as well as provide access to online resources available through the online catalog.

The Music Library, located in Room 113 of the Mary Duke Biddle Music Building, and the Music Media Center, located in Room 027 of the same building, are administered as a single branch library within the Perkins Library system. The Music Library contains a rapidly expanding collection of scholarly reference materials, books on music, music scores, and over 200 journals in the field. The Music Media Center has a collection of over 17,000 media items, including compact discs, cassettes, LP recordings, laser discs, and videotapes, plus a collection of over 10,000 microforms, along with various facilities for listening and viewing.

The libraries at Duke, North Carolina Central University, the University of North Carolina at Chapel Hill, and North Carolina State University are connected by a computer network. Members of the Duke community can easily and quickly determine what books and other library materials are held by UNC, NCCU, and NCSU. Through a reciprocal borrowing agreement, faculty and students at Duke may borrow materials from both of these libraries.

Reference librarians are on duty in Perkins Library for most of the hours the library is open. Their primary responsibility is to assist patrons in making the most effective use of information resources including library collections and facilities. In addition to answering specific questions, the reference librarians also help patrons access information by identifying and explaining the use of library sources and by giving formal and informal instruction to groups of students, faculty, or staff. Professional reference service is available to students in all other campus libraries.

Tours of the Perkins Library are given frequently during Orientation Week and upon request throughout the year. Information about other campus libraries may be obtained from the staff in each of the libraries. Handbooks about library services and facilities are also available in each of the libraries.

The library has both facsimile and copying services. The rules with regard to copyright and a schedule of fees for reproduction services are available in the library at the point of service.

The Medical Center Library. The Medical Center Library, located in the Seeley G. Mudd Communications Center and Library Building, provides the services and collections necessary to further educational, research, and clinical activities in the medical field. Services are available to the students, faculty, and staff of the School of Medicine; of the Division of Allied Health; of Duke Hospital; and of the graduate departments in the basic medical sciences. Other students and faculty needing access to biomedical literature may apply for privileges upon application to the head of the Circulation Department.

Over 270,000 volumes are available, including the Trent Collection in the History of Medicine. Approximately 2,700 journal subscriptions are received currently, in addition to extensive back files of older materials. The library has several types of audiovisual materials and equipment. With the exception of certain items shelved on reserve, these materials have been shelved after the general book collection or integrated into the journal collection and are listed in the online catalog. The Frank Engel Memorial Collection consists of a small group of books on nonmedical subjects for general reading, together with several newspapers and popular magazines. Traditional library services are supplemented by mediated and self-service on-line database searching. Photocopy service is available to eligible students, faculty, and staff. Copyright information and a schedule of fees are available in the library at the point of service.

Uniform borrowing privileges apply to all registered users. Details of loan and other services may be found in the guide which is published each year and is available at the library.

The School of Law Library. The School of Law Library, with over 450,000 volumes, serves both the university and the local legal community. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. A large section of the library collection is devoted to treatises on all phases of law, as well as history, economics, government, and other social and behavioral sciences relevant to legal research. The treatises are organized in the Library of Congress classification system and most are accessible through the Duke University online catalog. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. The library receives the records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, and the North Carolina Supreme Court and Court of Appeals. In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics. Undergraduate and graduate students whose course of study requires access to legal literature may use the library. However, access to the library may be restricted during certain times.

University Archives. The Duke University Archives, the official archival agency of the university, collects, preserves, and administers the records of the university having continuing administrative or historical value. The institutional archives, which also include published material, photographs, papers of student groups and faculty, and selected memorabilia, are available for research under controlled conditions in 341 Perkins Library.

The Office of Information Technology. For a contemporary university, extensive computing resources are essential. At Duke, the Computer ASSIST Center within the Office of Information Technology is the organization that works in partnership with members of the university community to enable them to achieve their goals through computing.

The Computer Assist Center supports extensive personal computer and Unix workstation services located throughout the campus. There are six Unix workstation laboratories and clusters containing DEC computers, located in the North, Sociology-Psychology, Biological Sciences, Carr, and Engineering buildings. These workstations are connected to two DEC compute servers, one sun compute server, and seven file servers. There are three laboratories of MS-DOS based computers housed in North, Perkins, and West Duke buildings, five other clusters of MS-DOS computers, and nine clusters of Macintosh computers spread throughout the campus. All clusters have dot matrix or laser printers and most are connected to the campus network (DukeNet). While there is a slight charge for use of the laser printers, there is no charge for use of the computers. Free e-mail accounts are available for students from Computer ASSIST.

DukeNet is a fiber optics, backbone network, available in most campus buildings, that provides access to the DEC Unix System, to the Perkins Library online catalog, and to other computing resources, both at Duke, and nationwide over the Internet network. DukeNet is managed by Network Communications (NetComm) at Duke. All undergraduate dormitory rooms are now wired for DukeNet. DukeNet access is also provided by dialing into a terminal server from a PC with a modem.

Other computing facilities available include mainframe services on an IBM ES/9000 provided by the Duke University Computation Center (DUCC) and supercomputing services on a Cray Y-MP and a Kendall Square KSR-1 parallel computer provided by the North Carolina Supercomputing Center (NCSC).

More specific information regarding Duke computing facilities may be obtained by calling the Computer ASSIST Center Consulting Desk at 660-2983, 9:00 A.M. to 5:00 P.M., Monday through Friday.

Science Laboratories. In addition to the teaching and research laboratories in the departments of natural and social sciences and in the School of Engineering, there are other facilities in which some advanced undergraduates work on individual projects. These include the Duke University Marine Laboratory in Beaufort, North Carolina; the Phytotron of the Southeastern Plant Environment Laboratories, located on the Duke campus; the Duke Forest, adjacent to the campus; the Duke University Primate Center in Duke Forest; the Triangle Universities Nuclear Laboratory; and the Free Electron Laser Laboratory, also on campus. The Levine Science Research Center, which opened recently, houses 341,000 gross square feet consisting of laboratories, office and classroom space for interdisciplinary science research, state-of-the-art teaching laboratories, and shared instrumentation facilities. In particular, undergraduates will have the opportunity to use the expanded laboratory space in the center for research for their own academic work or as assistants to others.

Duke as a Residential University

Duke has a long tradition as a residential university and has sought to provide for the great majority of the undergraduates convenient on-campus housing in both residence halls and apartments. While the university was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

Educational, cultural, and outdoor adventure programming is planned and presented throughout the year for living groups through the cooperative work of the Office

of Student Development, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are a number of faculty members who live in residence halls. Faculty offices and seminar rooms are also located in several houses. The goals of these various programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside of the formal classroom, and to develop a greater sense of community within the individual residence halls as well as within the greater university.

The Undergraduate College and School

In Trinity College of Arts and Sciences and the School of Engineering, instruction is offered by university faculty who engage in research and in graduate and undergraduate teaching. Duke offers its undergraduates the opportunity to study with many internationally recognized experts in their disciplines and with faculty members who are jointly committed to undergraduate instruction and to the advancement of knowledge. The university recognizes that students learn not only through formal lectures, but also through the interplay of ideas among faculty members and students; thus, it offers undergraduates opportunities to test their ideas against those of their professors and to observe at close range those who have committed their lives to academic careers.

The university, if it is doing its job properly, is educating citizens of the United States and of the world, not only individuals aspiring to personal fulfillment. At Duke, the men and women who earn degrees are likely to become leaders in industry, government, and the professions. They will have influence on and will be influenced by the social fabric of which they are a part. The kind of people they become will matter not only to them and their families, but also to their communities, to the United States, and to the countries of the rest of the world as well.

Amidst changing external conditions, the university must ensure that students acquire the tools and flexibility to prepare them for life-long learning activities.

Trinity College of Arts and Sciences. In Trinity College, the liberal arts are a means through which students explore the world of ideas from art and music to neurosciences and physics. The undergraduate program, rated one of the finest in the country, helps students learn how to deal successfully with the challenges, intellectual and philosophical, that modern life provides. Trinity College is a community of outstanding students and talented, nationally-ranked faculty. As members of this community, students learn to ask questions, analyze rationally, challenge ideas, and contribute to the continuing development of knowledge.

The Trinity experience offers a traditional liberal arts base of study and currently offers, within broad limits, exposure to great ideas in six major areas: arts and literatures, civilizations, foreign languages, quantitative reasoning, natural sciences, and social sciences. It offers exposure across a broad spectrum as well, and interdisciplinary and interdepartmental programs stretch horizons even further. Internships and apprenticeships in areas related to students' majors are increasingly available so that practical experience can complement a more formal education. In a world where people are drawn ever closer together, the understanding of cultural difference and diversity becomes increasingly important. Our study abroad programs are varied and plentiful.

The undergraduate college of arts and sciences is unique in that it is set within a distinguished research university. We believe that this combination provides unparalleled opportunities for interaction with faculty, both inside and outside the classroom. The arts and sciences faculty boasts some of the most highly rated scholar-teachers in the country. They challenge students both to master and to reach beyond the basics of fundamental knowledge. At Duke there is a genuine concern for learning, and students are prepared by academic challenges and their individual experiences for the critical decision-making required of them for participatory citizenship, full personal lives, and successful careers.

School of Engineering. The undergraduate engineering program at Duke University is designed both for students who intend to become professional engineers and for those who desire a modern, general education based on the problems and the promises of a technological society. The environment in which students are educated is as important in shaping their future as their classroom experiences. In the Duke School of Engineering this environment has two major components: one is modern technology derived from the research and design activities of faculty and students in the school; the other is the liberal arts environment of the total university, with its humanitarian, social, and scientific emphases.

Engineering is not a homogeneous discipline; it requires many special talents. Some faculty members in the School of Engineering are designers; they are goal-oriented, concerned with teaching students how to solve problems—how to synthesize relevant information and ideas and apply them in a creative, feasible design. Other engineering faculty members function more typically as scientists; they are method-oriented, using the techniques of their discipline in their teaching and research to investigate various natural and artificial phenomena.

Degree Programs



Degrees and Academic Credit

Duke University offers in Trinity College of Arts and Sciences the degrees of Bachelor of Arts and Bachelor of Science, and in the School of Engineering the degree of Bachelor of Science in Engineering. Within the curriculum of each college or school, students have the major responsibility for designing and maintaining a course program appropriate to their background and goals. They are assisted by faculty advisors, departmental directors of undergraduate studies, and academic deans.

Credit toward a degree is earned in units called semester courses (s.c.), commonly abbreviated as courses. These courses ordinarily consist of three to four hours of instruction each week of the fall or spring semester or the equivalent total number of hours in a summer term. Double courses, half courses, and quarter courses are also recognized.

Trinity College of Arts and Sciences

A variety of approaches to a liberal education is provided by Program I and II. Either program leads to the Bachelor of Arts or Bachelor of Science degree, and each requires thirty-four semester courses.

PROGRAM I

Program I provides for the experience and achievement that constitute a liberal education. The ability to organize ideas and to communicate them with clarity and precision is refined by completing the writing course and by the requirement for discussion in small groups. Knowledge of a foreign language contributes to an understanding of the nature of language itself and to perspectives on other cultures. Through courses in arts and literatures students learn about the creative products of the human intellect; courses about civilizations ask students to attend to the analysis and evaluation of ideas and events that shape civilizations past and present. Through courses in natural sciences students learn how to interpret and utilize information in an increasingly technological world, while courses in quantitative reasoning help develop skills of inference and analysis. Finally, through courses in the social sciences students learn about the causes of human behavior and about the origins and functions of the social structures in which we operate.

Students must complete the requirements listed below and explained, where necessary, on the following pages. No degree requirements, except the requirement for

thirty-four course credits and continuation requirements, may be met by a course passed under a pass/fail option unless the course is offered only on that basis.

Students must accept personal responsibility for understanding and meeting the requirements of the curriculum.

Writing. Students are required to demonstrate ability to write effective English prose by completing a course in expository writing, ordinarily University Writing Course 4, 5, 6, 7, or 8. See the section University Writing Program in the chapter "Courses of Instruction."

General Studies consisting of courses in five of the following six areas of knowledge:

Arts and Literatures (AL)
Civilizations (CZ)
Foreign Languages (FL)
Natural Sciences (NS)
Quantitative Reasoning (QR)
Social Sciences (SS).

- In four of these areas a student must take three courses; at least one of the three in each area must be at the 100-level.
- In the remaining area a student must take two courses.
- Advanced placement credits will *not* substitute for courses in these areas.
- Courses counting toward requirements in a major (and additional courses taken in the major department) do not count toward more than two of these areas.

The Major consists of the requirements for majors in the department or program in which a student wishes to obtain a bachelor's degree (see below). These requirements are described under the course listing for each department or program.

The Minor. Minors are available although not required, and an increasing number of departments/academic programs offer them.

Elective courses. Advanced placement credits may function as elective courses. Courses that a student is using as electives may or may not carry an area of knowledge designation.

Small Group Learning Experiences.

- During the first year: one of the following: (1) a first-year seminar (49S), (2) a 20-series seminar, (3) a FOCUS program seminar, (4) Engineering 10, or (5) any other course designated as a seminar.
- During the junior and senior years: at least two full courses designated as seminars, tutorials, independent study, or a thesis.

Course credits. There are several separate and specific requirements concerning course credits in Trinity College. Thirty-four (34) courses are required for graduation, not more than two with a grade of D, and including:

- At least seventeen (17) at Duke (including the senior year).
- For any major (including courses that the major department or program requires outside itself): a department or program may require no more than seventeen (17) total for a Bachelor of Arts major and no more than nineteen (19) for a Bachelor of Science major.
- At least twelve (12) courses at or above the 100-level.
- No more than: one credit of physical education activity (i.e., two half-credit activity courses), four credits of dance / American Dance Festival technique/performance (i.e., eight half-credit courses), two credits for house courses (i.e., four half-credit house courses), six from a professional school (e.g., business, engineering, medicine), and four in military science.

Quality of Work. Passing grades are expected in all course work, but see pages below for minimum continuation requirements.

General Studies (Distribution of Courses). Students achieve breadth and balance of intellectual experience by taking courses in at least five of the six areas of knowledge. Courses that can be taken to satisfy the distribution requirement are identified in the bulletin by a two-letter code (AL, CZ, FL, NS, QR, SS). In four of the areas of knowledge a student must take at least three courses. At least one of the three courses must be at the 100 or 200 level. In one additional area of knowledge a student is required to take at least two courses. Courses counting toward requirements in a major (and additional courses taken in the major department) do not count toward more than two of these areas.

The Major. Students are expected to acquire some mastery of a particular discipline or interdisciplinary area as well as to achieve a breadth of intellectual experience. They therefore complete a departmental major, an interdisciplinary major, or an interdepartmental concentration. At least half the courses for a student's major field must be taken at Duke although departments may make exceptions to this rule in special circumstances. Students are responsible for meeting the requirements of a major as stated in the bulletin for the year in which they matriculated in Trinity College although students have the option of meeting requirements in the major changed subsequent to the students' matriculation. A student who completes requirements for two majors may have both recorded on the official record. See the chapter "Academic Procedures and Information" for the majors within each degree and for procedures on declaring a major.

Departmental Major. The courses for a departmental major may include introductory or basic prerequisite courses and higher-level courses in the major department or in the major department and related departments. The courses required in the major department must include at least five beyond the introductory or basic prerequisite level. The total number of courses required at any level in the major and related departments may not exceed seventeen semester courses for the Bachelor of Arts degree and nineteen semester courses for the Bachelor of Science degree. Departmental majors are available in art history, biological anthropology and anatomy, chemistry, classical languages, classical studies, computer science, cultural anthropology, economics, English, French studies, geology, Germanic languages and literature, history, Italian studies, mathematics, music, philosophy, physics, political science, psychology, public policy studies, religion, Slavic languages and literatures, sociology, Spanish, and visual arts. The courses required for a major are specified by the department. The requirements appear in the section following each department's course descriptions.

Program Major. Students may satisfy the requirement by completing work prescribed for a major in approved programs, often interdisciplinary. These programs include African and Afro-American studies, biology, Canadian studies, comparative area studies, drama, environmental science and policy, literature, medieval and Renaissance studies, and women's studies. The requirements for these majors appear under each program in the chapter "Courses of Instruction."

Interdepartmental Major. A student may pursue an interdepartmental major program designed by the student and advisors as an alternate means of satisfying the major requirement. An interdepartmental major consists of at least three courses beyond the introductory level (i.e., at the 100- or 200-level) in each of two or more Trinity College departments or programs that offer majors. For procedures see the section on declaration of major or division in the chapter "Academic Procedures and Information."

The Minor. The courses required for a minor are specified by the department/academic program. They must include a minimum of five courses, including at least three at the level of 100 or above. Further information about specific minors is available under the description of the department/academic program in the chapter "Courses of Instruction."

tion.” (For information about the availability of minors not yet listed in this bulletin, consult the office of the relevant department.)

Certificate Programs. Various certificate programs, analogous to a minor and often interdisciplinary in nature, are offered in Trinity College. They include: Institute of the Arts; African and Afro-American Studies (also a major); Asian and African Languages and Literatures; Canadian Studies; Dance; Early Childhood Education Studies; Film and Video; Genetics; Health Policy; Human Development; Interdisciplinary Program in German Studies; Judaic Studies; Markets and Management Studies; Neurosciences; Perspectives on Marxism and Society; Primatology; Science, Technology, and Human Values; and Women’s Studies (also a major).

Fuller descriptions of these certificate programs appear in the chapters “Specialized Programs Within Academic Units” and “Courses of Instruction.”

Small Group Learning Experiences. By supplementing the classroom and lecture methods of instruction, small group learning experience courses assure students opportunities to engage in discussion, develop skills, refine judgment, and defend ideas when challenged. A *seminar* (ordinarily indicated by the suffix *S*) is an independent course of twelve to fifteen (exceptionally to twenty) students who, together with an instructor, engage in disciplined discussion. The number of meeting hours per term is the same as for regular courses of equivalent credit. Instructors are encouraged to present to each student at the end of the term a written evaluation of the student’s work. A *discussion section* (*D*) is a group of fifteen students (exceptionally to twenty) and an instructor, in which discussion is the paramount characteristic; it is an integral part of a larger regular course, and every member of the class is enrolled. A *preceptorial* (*P*) is a group of usually no more than twelve students and an instructor in which discussion is the primary component; it is an additional and optional unit attached to a regular course involving one or more extra meetings per week. No additional course credit is given for a preceptorial. A *tutorial* (*T*) is a group of one to five students and an instructor meeting for discussion which is independent of any other course. For *independent study* students pursue their own interests in reading, research, or writing, but meet with an instructor for guidance and discussion. See the section on independent study in the chapter “Academic Procedures and Information.” Instructors in all courses that satisfy the requirements for small group learning experiences, including independent study, must meet with the students at least once every two weeks. The requirements for small group learning experiences are listed under Program I, above. Preceptorials, discussion sections, seminars, and tutorials may not be taken on the pass/fail basis, unless the course is offered only on that basis.

Course Requirements. Thirty-four semester courses are required for graduation, including a maximum of two courses passed with a grade of *D*. At least seventeen courses, including the work of the senior year, must be passed at Duke. Twelve courses must be at the advanced (100-200) level. The thirty-four course credits may include (1) no more than seventeen total for a major (including those required in related departments) under the Bachelor of Arts degree and no more than nineteen total for a major (including those required in related departments) under the Bachelor of Science degree; (2) no more than one semester-course credit in physical education activity courses; (3) no more than four semester-course credits in dance/American Dance Festival technique/performance courses (i.e., a total of eight half-credit courses); (4) no more than two credits for house courses; (5) no more than six credits for courses taken in professional schools; and (6) no more than four semester-course credits in military science. Certain military science courses listed as carrying credit do not count toward graduation but appear on a student’s permanent academic record. Military science courses, like professional school and all physical education courses, do not satisfy general studies (area of knowledge) requirements. (American Dance Festival courses are included in

the total limitation on dance technique/performance courses as noted above in this paragraph.)

Residence. A residence period of eight semesters is the typical amount of time a student may take to earn either the Bachelor of Arts or the Bachelor of Science degree. This period may be extended for one or two semesters by a student's academic dean for legitimate reasons, if it seems probable that an extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted residence of more than ten semesters in order to be graduated.

For the minimum residence period, at least seventeen courses must be satisfactorily completed at Duke, including the courses needed to meet the senior year residence requirement. (For the purposes of the residence requirement, advanced placement credits are not considered as courses taken at Duke.) If only seventeen courses are taken at Duke, they must include the student's last eight courses. A student with more than seventeen courses at Duke may take two of the last eight courses at another approved institution. A student who has completed twenty-six courses at Duke may take four of the last eight courses at another approved institution. Courses taken elsewhere must be approved in advance by the appropriate director of undergraduate studies and the student's academic dean.

Former students of Trinity College or the Woman's College who have been out of college for at least six years, and left in good standing, may, with certain provisos, take up to eight semester-courses in another institution of approved standing in final fulfillment of graduation requirements. Further information can be obtained from the associate dean of Trinity College of Arts and Sciences responsible for coordinating readmission.

Quality of Work (Continuation Requirements). A student must achieve a satisfactory record of academic performance each term and make satisfactory progress toward graduation each year to continue enrollment in college. A student who fails to meet the minimum requirements described below must leave college for at least two semesters; a summer session may be counted as a semester. The student may apply to Trinity College of Arts and Sciences for readmission. If, after readmission, the student again fails to meet continuation requirements, the student will be ineligible, except in extraordinary instances, for readmission to Trinity College. Students admitted to degree programs from Continuing Education should consult their academic deans concerning continuation requirements.

Satisfactory Performance Each Term. A student who does not receive a passing grade in all courses must meet the following minimum requirements or be withdrawn from the college.

In the Fall or Spring Semester: (1) in the first semester of enrollment at Duke, a student with a normal course load (of at least four semester courses, as defined in the chapter "Academic Procedures and Information") may not fail more than two full courses; (2) after the first semester at Duke, a student with four or more courses may not fail more than one full course; (3) a first-semester student, whether a freshman or a transfer student, who for a special reason has received permission from an academic dean to enroll in fewer than four courses may not fail more than one full course; (4) a student taking an authorized underload after the first semester at Duke must earn all passing grades. (Students may not carry an underload without the permission of their academic dean.) For the purposes of continuation, incomplete work in any course is considered a failure to achieve satisfactory performance in that course. Therefore, where continuation is in question, incomplete work in any course must be completed with a passing grade in time for final grades to be submitted to the Office of the Registrar no later than the weekday preceding the first day of classes of the spring semester, or prior to the first day of classes of the second term of the summer session, as appropriate. In the case of incomplete work in the spring semester, this requirement applies whether or not the

student plans to attend one or more terms of the summer session. The student, however, may not enroll in a summer term at Duke unless the requirement of satisfactory performance each semester has been satisfied.

In the Summer Session: to maintain enrollment at Duke a student may not fail more than one full course in a summer term or a summer session. For purposes of continuation, incomplete work is considered failure to achieve a satisfactory performance in that course. Therefore, when eligibility to continue from the summer session to the fall is in question, incomplete courses must be satisfactorily completed in time for a passing grade to be submitted to the Office of the Registrar no later than the weekday preceding the first day of fall classes. Moreover, no student may enter the fall semester with more than one incomplete grade from the preceding spring and summer.

Any student excluded from the college under the provisions of these regulations may on request have the case reviewed by the senior associate dean of Trinity College of Arts and Sciences.

Satisfactory Progress toward Graduation. Each year prior to the beginning of fall term classes, a student must have made satisfactory progress toward fulfillment of curricular requirements to be eligible to continue in the college; i.e., a certain number of courses must have been passed at Duke according to the following schedule:

<u>To be eligible to continue to the</u>	<u>A student must have passed</u>
2nd semester at Duke	2 semester courses at Duke
3rd semester at Duke	6 semester courses at Duke
4th semester at Duke	10 semester courses at Duke
5th semester at Duke	14 semester courses at Duke
6th semester at Duke	19 semester courses at Duke
7th semester at Duke	22 semester courses at Duke, plus two additional courses*
8th semester at Duke	26 semester courses at Duke, plus two additional courses*

For students who have interrupted their university studies, the continuation requirement must still be satisfied before the beginning of each fall term. For such students, the number of courses needed to satisfy the continuation requirement is determined from the table above, based on which semester they will enter in the fall term.

Courses taken in the summer term at Duke may be used to meet this requirement; except as noted,* advanced placement may not be used to satisfy it. No more than two courses completed with D grades may be counted toward fulfilling this annual continuation requirement.

PROGRAM II

Nature and Purpose. Program II is an alternate approach leading to either the Bachelor of Arts or the Bachelor of Science degree. It offers the student who has an unusual interest or talent in a single field, or an unusual combination of interests or talents in several fields, an opportunity to plan and carry out a special curriculum adapted to these interests and needs. Students, with the assistance of a departmental Program II advisor, design an individual plan of study for the whole or the remainder of their college career. Advisor and student together assess the student's background, needs, and goals and evaluate the resources at the university or outside it as means of satisfying those goals. They consider what academic courses would be useful and also take into account that a term of independent study or work/study on or off campus, or a period of study abroad, might be appropriate. Each curriculum is tailored to the special

*The additional semester courses may be earned through advanced placement and/or transferred courses.

interests and talents of the student for whom it is designed. Among the many topics for Program II have been American studies, primatology, dramatic literacy, linguistics, mariculture, modern thought, mass communications, Arabic studies, and bioethics.

Admission. Students interested in Program II should confer with the directors of undergraduate studies in the departments closest to their interests, with the dean responsible for Program II, and with the chair of the Committee on Program II, whose name may be obtained from 04 Allen Building. If the student seems eligible for Program II, the director or other departmental advisor, or an interdepartmental committee, will counsel the student concerning the design of the curriculum. When an interdepartmental committee is needed, one department will bear administrative responsibility. The curriculum must be approved by the department and also by the Committee on Program II of the Undergraduate Faculty Council of Arts and Sciences. Upon endorsement by that committee, the program becomes an obligation assumed by the student although it may be modified later with the approval of the department and the Committee on Program II. Each semester the student's progress in achieving the plan is reviewed by the dean responsible for Program II.

Until formally accepted into Program II, a student should register for courses to satisfy the curricular requirements of Program I. Should Program II be dropped for any reason, the student assumes all requirements of Program I. Ordinarily, students will be accepted into Program II only after their first semester at Duke; they are ineligible for admission to Program II after their junior year. Further information about Program II may be obtained from the office of the academic dean responsible for Program II, in 04 Allen Building.

General Requirements. Apart from the requirements arising from the approved plan of work, a Program II student must satisfy certain general requirements: thirty-four semester-course credits for graduation; breadth requirements; the regulations on military science, house, professional school, and physical activity and dance courses; and residence, although the requirements relating to the last eight courses may be adjusted to suit the student's approved plan of work. Graduation with distinction and Latin honors by honors project are available for qualified students in Program II. See the section on honors in the chapter "Academic Procedures and Information."

COMBINATION PROGRAMS OF TRINITY COLLEGE AND DUKE PROFESSIONAL SCHOOLS

A student interested in attending a Duke professional school (business, environment, and law) may, upon meeting certain requirements, combine the senior year in Trinity College of Arts and Sciences with the first year in the professional school. To qualify the student must (1) successfully complete twenty-six semester courses in Trinity College; (2) fulfill all other degree requirements in Trinity College except for eight elective courses; (3) obtain the approval of the appropriate preprofessional advisor and academic dean in Trinity College; and (4) be admitted to the professional school. If the student's application to the professional school is accepted, the student transfers to the professional school for the fourth year and begins work on the professional degree. Upon successful completion of the work in the first year of the professional school, the baccalaureate degree is awarded to the student. The undergraduate record notes the student's enrollment in the combination program, the name of the professional school, the date of graduation from Trinity College, and the degree awarded, but it does not include courses taken in the professional school. Counseling and additional information are available from the preprofessional advisors.

PREPARATION FOR GRADUATE AND PROFESSIONAL SCHOOLS

Students planning to enter a graduate or professional school should consult their faculty advisors, director of undergraduate studies, or academic dean at the earliest

opportunity. Since many graduate and professional schools require special tests for students seeking admission, information regarding requirements should also be obtained from the catalogs of the appropriate schools. The Office of Counseling and Psychological Services will provide applications for the testing programs.

Graduate Schools of Arts and Sciences. Students interested in obtaining a master of science, master of arts, or doctor of philosophy degree should discuss their plans as early as possible with faculty in the proposed field of advanced study and obtain a copy of "Preparing for Graduate Study," a handbook available from the Premajor Advising Center or 04 Allen Building. As undergraduates, they should become involved in research which may involve laboratory work, advanced seminars, or independent study. Many graduate schools require a reading knowledge of a foreign language. Information on this and other requirements is available in the bulletins of specific graduate programs and in the Directory of Graduate Programs published by the GRE board and Council of Graduate Schools. It may also be included in the "Handbook for Majors" for the major department. A research mentor, a faculty advisor, and the Ph.D. advisor in the major department are the best resources for advice about graduate school in the arts and sciences. General advice may be sought from the advisor for pre-graduate study, 04 Allen Building.

Graduate Schools of Engineering. Students interested in graduate work in engineering should consult the dean of the School of Engineering or the director of graduate studies in one of the engineering departments. Most engineering graduate schools require that a candidate have the equivalent of a Bachelor of Science in Engineering degree; however, students in the natural and social sciences may obtain conditional admission if they have a sufficient background in mathematics.

Graduate Schools of Business. Students seeking information about graduate schools of business should consult the advisor in Trinity College. In preparing for graduate business school, students should gain a good liberal arts background, choosing courses that will help them develop communication skills, analytical skills, and an understanding of human nature. Students have often chosen such courses as Computer Science 1, Economics 1D and 2D (or 51 and 52), Management Sciences 53, and Mathematics 31 as those which develop analytical skills. For further information concerning undergraduate preparation, see the *Prebusiness Handbook for Duke Seniors and Alumni* and *The Official Guide to MBA Programs*, published by the Graduate Management Admission Council; these publications and other resource materials are available in the Prebusiness Advising Office, 03 Allen Building.

Medical and Dental Schools. Students planning to enter schools of medicine and dentistry can prepare for admission by completing any of the regular departmental majors in Program I or by completing Program II, and by taking those courses required by the professional schools of their choice. Virtually all medical schools and most schools of dentistry require the same basic group of college premedical courses—a year of biology, a year each of inorganic and organic chemistry, and a year of general physics. In addition, many schools require a year of English and courses in the humanities or social sciences. About a third of all medical schools require a year of college mathematics and some specify calculus, statistics, or computer science. For a complete listing of these and any additional course requirements set by each school, consult *Medical School Admissions Requirements*, published by the Association of American Medical Colleges or *Admission Requirements of U.S. and Canadian Dental Schools*, published by the American Association of Dental Schools. These and similar resources for schools of optometry and veterinary medicine are located in the Health Professions Advising Office. Students should discuss their programs of study with their major advisors, academic deans, and with the advisor for the health professions.

Graduate Programs in the Health Professions. Students interested in careers as physical therapists, health administrators, or others of the allied health professions should prepare with course work in the natural sciences and behavioral sciences within a liberal arts curriculum. Descriptive literature on each of the allied health schools and professions is part of the library maintained in the Health Professions Advising Office. Students will also find publications of selected advanced degree programs in biomedical research, including the combined M.D./Ph.D. degree programs.

Law Schools. Students who plan to prepare for law school and a career in law should seek breadth in their undergraduate course program with specialization in one or more areas. They may choose virtually any field for their major work. Though no specific courses are required, prelaw students have often chosen from among the following: Management Sciences 53; Economics 1D, 2D; English 117S; History 21D, 22D, 91D, 91S, 92, 92D, 92S, 241-242; Philosophy 48; Political Science 91D, 127, 207S; Public Policy Studies 55D; Sociology 10D and 157.

For a fuller discussion of undergraduate preparation for the study of law, students should refer to the *Duke Prelaw Handbook* or the *Prelaw Handbook* published by the Association of American Law Schools and the Law School Admission Council, or consult the prelaw advisor in the college.

Theological Schools and Religious Work. Students contemplating theological study should correspond at the earliest opportunity with the appropriate schools and with the authorities of their respective judicatories to learn how to prepare for the specific programs they expect to enter. They should consider the following subjects: English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; psychology, sociology, and anthropology; the fine arts and music; biblical and modern languages; religion, both in the Judeo-Christian and in the Near and Far Eastern traditions. Some seminaries require Greek or Hebrew for admission. It is the understanding gained in these fields rather than the total number of credits or semester hours earned that is significant. More detailed information about theological education, not limited to Duke, may be obtained from the director of admissions of the Divinity School.



The School of Engineering

Duke University offers in the School of Engineering programs of study which lead to the degree of Bachelor of Science in Engineering. Four programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). These programs are biomedical engineering, civil engineering, electrical engineering, and mechanical engineering. These accredited programs, and special programs of study in interdisciplinary fields, are offered by the Departments of Biomedical Engineering, Civil and Environmental Engineering, Electrical Engineering, and Mechanical Engineering and Materials Science.

For graduation with a Bachelor of Science in Engineering degree, a student must complete successfully a minimum of thirty-four semester courses. These thirty-four semester courses must include the following:

General Requirements*

Writing	1 s.c.	This requirement is met by completing a University Writing Course.
Mathematics	4 s.c.	This requirement is met by completing Mathematics 31, 32, and 103; plus 104 or 111 or 135.†
Natural Science	4 s.c.	This requirement is met by completing Chemistry 11L, Physics 51L and 52L, and an elective course in one of the natural science departments which presents fundamental knowledge about nature and its phenomena, preferably including quantitative expression.†§
Humanities and Social Sciences	5 s.c.	This requirement is met by completion of five courses selected from at least three of the following four areas of knowledge: Arts and Literatures (AL), Civilizations (CZ), Foreign Languages (FL), and Social Sciences (SS). At least one course must be classified SS. In order to provide depth in the subject matter, at least two of the five courses must be selected from a single department and at least one of those courses must be 100-level or above. This program of courses should reflect a thematic coherence and fulfill an objective appropriate to the engineering profession. Courses selected must be those which present essential subject matter and substance of the discipline; for example, no introductory skill courses may be used to satisfy this requirement. Likewise, courses devoted primarily to subjects such as accounting, management science, industrial management, finance, personnel administration, and ROTC do not fulfill this objective regardless of their general value in the total engineering curriculum. Courses taught in professional schools may not be used to satisfy this requirement.
Engineering and Applied Sciences	4 s.c.	This requirement is met by completion of one course from each of four of the following six areas: electrical science, information and computer science, mechanics (solid and fluid), materials science, systems analysis, and thermal science and transfer processes. See departmental requirements, which follow, for any specific courses to be included

*No more than 1 s.c. credit in physical education activity and 1 s.c. credit in music activity can be used to meet Bachelor of Science in Engineering degree requirements. House courses may not be used to meet BSE degree requirements.

†A minimum of 9 s.c. credits in mathematics, natural science, and statistics are required.

§Physics 53L and 54L may be substituted for Physics 51L and 52L. Courses in mathematics, statistics, and computer science will not meet the elective requirement. A list of disallowed courses is maintained in the dean's office.

Digital Computation

Students are expected to have acquired digital-computer programming capability before their sophomore year. The programming capability may be satisfied by Advanced Placement or by passing Engineering 53L or Computer Science 6 or 8.

Departmental Requirements

Departmental
Specifications 16 s.c.

The department administering the major field of study will specify this requirement. In general, it will consist of both required courses and electives to be planned in consultation with the departmental advisor. Including the 4 s.c. in engineering and applied sciences listed under general requirements, a total of 13.0 s.c. in engineering work including 8.5 s.c. equivalents in engineering science and 4.25 s.c. equivalents in engineering design are required. See the individual departmental requirements, which follow.

*Total Minimum
Requirement 34 s.c.

Biomedical Engineering Departmental Requirements

All general requirements and departmental requirements comprising the accredited biomedical engineering major are incorporated in the following sequence, only one of several possible sequences. The student is encouraged to choose electives and select a sequence which develops broad intellectual interests.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11L	1	Chemistry 12L	1
University Writing Course	1	Physics 51L	1
Mathematics 31	1	Mathematics 32	1
Engineering 53L or Social Science or Humanities Elective	1	Social Science or Humanities Elective or Engineering 53L	1
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Physics 52L	1	Biomedical Engineering 163.....	1
Electrical Engineering 61	1	Elective	1
Mathematics 103	1	Mathematics 111	1
†Biomedical Engineering 83 or Engineering 83	1	Social Science or Humanities Elective	1
Elective	1	Life Science Elective	1
	5		5

*A maximum of two semester courses of junior or senior level air science, military science, or naval science course work may be counted in satisfying the minimum requirements of thirty-four semester courses for a baccalaureate degree in engineering. These courses must be included in the sixteen semester courses listed under departmental requirements. All other courses completed in air, military, or naval science are taken in addition to the minimum program.

†Biomedical Engineering 83 is not required for students who complete a second major in electrical engineering.

Junior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering 110 or Engineering 75L	1	Biomedical Engineering 145 or Mechanical Engineering 101L or Electrical Engineering 176	1
Electrical Engineering 64 or Biomedical Engineering 171	1	Life Science Elective	1
Biomedical Engineering 101	1	Biomedical Engineering 164	1
Social Science or Humanities Elective	1	Mathematics 114	1
	<u>4</u>		<u>4</u>

Senior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering 207	1	Biomedical Engineering Elective	1
Statistics 113	1	Biomedical Engineering Elective	1
Biomedical Engineering Elective	1	Social Science or Humanities Elective	1
Biomedical Engineering Elective	1	Social Science or Humanities Elective	1
	<u>4</u>		<u>4</u>

Students preparing for medical school should schedule Chemistry 151L and 152L, and two life science electives before the end of their junior year by deferring some required courses to the senior year. Biomedical engineering electives include all courses with biomedical engineering numbers other than required courses. Mechanical Engineering 126 may be taken also as a biomedical engineering elective.

Civil And Environmental Engineering Departmental Requirements

All general and departmental requirements comprising the accredited civil engineering major are incorporated in the following typical sequence of courses. This sequence is only one of several possible sequences and students are encouraged to work closely with their advisor in choosing electives and selecting a sequence of courses to develop their individual interests.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11L	1	Engineering 24 L or Engineering 25L	1
Mathematics 31	1	Mathematics 32	1
Engineering 53L or Elective	1	Elective or Engineering 53L	1
University Writing Course	1	Physics 51L	1
	<u>4</u>		<u>4</u>

Sophomore Year

First Semester	Courses	Second Semester	Courses
Engineering 75L	1	Engineering 123L	1
Mathematics 103	1	Mathematics 111	1
Physics 52L	1	Engineering 25L or Engineering 24L	1
Elective	1	Elective	1
	<u>4</u>		<u>4</u>

Junior Year

First Semester	Courses	Second Semester	Courses
Civil Engineering 122L	1	Engineering 150L	1
Civil Engineering 131L	1	Elective or Statistics 113	1
Statistics 113 or Elective	1	Elective	1
Engineering 115	1	Elective	1
Elective	1	Elective	1
	<u>5</u>		<u>5</u>

Senior Year

First Semester	Courses	Second Semester	Courses
Elective	1	Civil Engineering 192.....	1
Elective	1	Elective	1
Elective	1	Elective	1
Elective	1	Elective	1
	<u>4</u>		<u>4</u>

The program of electives shall include: at least one of Electrical Engineering 61L, Engineering 83L, Mechanical Engineering 101L or Biomedical Engineering 145; at least five courses in humanities and social sciences; at least one course in the natural sciences; at least two courses chosen from Civil Engineering 116, 123L, and 139L; at least two 200-level civil engineering courses. Any higher level environmental engineering course may be substituted for Engineering 24L and/or any higher level structures course may be substituted for Engineering 25L.

Electrical Engineering Departmental Requirements

The general requirements and departmental requirements comprising the accredited electrical engineering major are all incorporated in the following program. This program is presented as a guide to assist students in planning their four-year program and should not be viewed as an inflexible sequencing of courses.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31	1	Mathematics 32	1
Chemistry 11L	1	Physics 51L	1
University Writing Course	1	Approved Elective	1
Computer Science 6 or 8 or Engineering 53L or Social Science-Humanities Elective....	1	Computer Science 6 or 8 or Engineering 53L or Social Science-Humanities Elective....	1
	<u>4</u>		<u>4</u>

Sophomore Year

First Semester	Courses	Second Semester	Courses
Mathematics 103	1	†Mathematics 1A	1
Electrical Engineering 61	1	Electrical Engineering 62	1
Physics 52L	1	Electrical Engineering 64	1
Social Science-Humanities Elective	1	Social Science-Humanities Elective.....	1
	<u>4</u>	Approved Elective	1
			<u>5</u>

Junior Year

First Semester	Courses	Second Semester	Courses
†Mathematics 1B.....	1	†Mathematics 1C	1
*Electrical Engineering 1A.....	1	Electrical Engineering 170.....	1
Electrical Engineering 163	1	*Electrical Engineering 1B	1
Social Science-Humanities Elective	1	Social Science-Humanities Elective.....	1
	<u>4</u>	§Natural Science Elective	1
			<u>5</u>

*To be selected from two of the following areas: computer engineering; signal processing and communications; solid state electronics and circuits; systems and robotics; electromagnetic fields and optics; power electronics.

†Students interested in computer engineering, signal processing and communications, systems and robotics, or power electronics should select Mathematics 104, 131, and 135 or Statistics 113. Students interested in solid state electronics and circuits or electromagnetic fields and optics should select Mathematics 111, 114, and 135 or Statistics 113.

‡To be selected from: mechanics (Engineering 75L or 123L, Mechanical Engineering 126L, or Biomedical Engineering 110); thermal sciences (Mechanical Engineering 101L, Electrical Engineering 176, Mechanical Engineering 150L, or Biomedical Engineering 145 or 202); or materials science (Engineering 83L or Biomedical Engineering 215).

§The following courses are recommended: Chemistry 12L; Physics 100, 105, 176, 181, and 185; Biology 21L.

Senior Year

First Semester	Courses	Second Semester	Courses
*Electrical Engineering 2A.....	1	Electrical Engineering Elective	1
Electrical Engineering Elective	1	*Electrical Engineering 2B	1
†Engineering Elective.....	1	Approved Elective.....	1
Approved Elective.....	1	Approved Elective	1
	4		4

Note: The selection of approved electives should take into account a departmental requirement that a student must have accumulated by graduation time the equivalent of 13.0 engineering courses including 4.25 engineering design and 8.5 engineering science courses. This engineering design requirement must include a course which is more than 0.5 ED and must be taken in the junior or senior year of the program. This course must have as a prerequisite at least one course in the discipline. Engineering 23, Engineering 174, and Engineering 175 may not be counted toward the departmental requirement.

In order to satisfy the School of Engineering distributional requirement of four courses in engineering and applied science, the student may use Electrical Engineering 61 as an electrical science course and Electrical Engineering 64 as a systems analysis course. The remaining two courses may be selected from any two of the following areas: information and computer science (Engineering 53L or Computer Science 6 or 8 may be used to satisfy this requirement), mechanics, materials science, and thermal sciences.

An up-to-date list of acceptable engineering design and engineering science courses may be obtained from the departmental office.

Mechanical Engineering and Materials Science Departmental Requirements

The general requirements and departmental requirements comprising the accredited mechanical engineering major are all incorporated in the following program. This sequence of the courses is presented as an overview of the program and is one of two recommended sequences of the course requirements.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31	1	Mathematics 32	1
Chemistry 11L	1	Physics 51L	1
University Writing Course	1	Engineering 83L	1
Engineering 53L or *Elective.....	1	†Elective or Engineering 53L	1
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Mathematics 103	1	Mathematics 111	1
Physics 52L	1	Mechanical Engineering 101L.....	1
Engineering 75L.....	1	Engineering 123L	1
†Elective	1	†Elective	1
†Elective	1	†Elective	1
	5		5

*To be selected from two of the following areas: computer engineering; signal processing and communications; solid state electronics and circuits; systems and robotics; electromagnetic fields and optics; power electronics.

†To be selected from: mechanics (Engineering 75L or 123L, Mechanical Engineering 126L, or Biomedical Engineering 110); thermal sciences (Mechanical Engineering 101L, Electrical Engineering 176, Mechanical Engineering 150L, or Biomedical Engineering 145 or 202); or materials science (Engineering 83L or Biomedical Engineering 215).

‡Part of a program of approved electives planned with the student's faculty advisor to suit individual interests and abilities. The program must include five social science-humanities courses selected to meet the general requirements of the School of Engineering.

Junior Year

First Semester	Courses	Second Semester	Courses
Mechanical Engineering 130L.....	1	Mechanical Engineering 141L.....	1
Mechanical Engineering 120L.....	1	Mechanical Engineering 150L.....	1
Mechanical Engineering 126L.....	1	Mathematics 114	1
Mechanical Engineering 115L.....	1	Physics 171L	1
	4		4

Senior Year

First Semester	Courses	Second Semester	Courses
Mechanical Engineering 160L	1	Mechanical Engineering Elective	1
Mechanical Engineering Elective	1	†Technical Elective.....	1
†Technical Elective.....	1	*Elective.....	1
*Elective.....	1	*Elective.....	1
	4		4

Declaration of Major. A student is urged to declare a major by the time of registration for the first semester of the sophomore year, but is required to do so by the time of registration for the first semester of the junior year. Declaration of major is accomplished by completing a form available in the Office of the Dean of Engineering.

Double Major. If an engineering student completes simultaneously the requirements for a departmental major in arts and sciences and the requirements for a Bachelor of Science in Engineering degree, or satisfies simultaneously the requirements for two engineering majors, the official record will indicate this fact. However, the director of undergraduate studies for the second major must certify that the departmental major requirements have been met. The student must initiate the procedure, either through the dean of the School of Engineering or through the director of undergraduate studies in the second department. The completion of the requirements for the major in this department must be confirmed no later than the time of registration for the final semester. Courses which are common to both majors shall be counted toward satisfying the requirements of both majors.

IDEAS. These interdisciplinary programs in engineering and applied science, leading to the Bachelor of Science in Engineering degree, provide opportunities for students to establish special majors in interdisciplinary fields such as computer engineering, environmental engineering, and materials science. Programs with a broad foundation in the engineering sciences also may be developed under this program by those who intend to enter non-engineering professions. Although not individually accredited, these programs satisfy the national engineering accreditation criteria.

Any student, in consultation with the advisor or another faculty member, may propose a unique combination of courses designed to meet particular career objectives. A proposal must be submitted to the associate dean of the School of Engineering and the Engineering Faculty Council for approval; it may be submitted as early as the second semester of the freshman year and must be submitted before the beginning of the senior year. The proposal must include a letter stating the student's reasons for pursuing the suggested program of study.

*Part of a program of approved electives planned with the student's faculty advisor to suit individual interests and abilities. The program must include five social science-humanities courses selected to meet the general requirements of the School of Engineering.

†One of two electives restricted to the areas of engineering, mathematics, or natural sciences. A list of disallowed courses is maintained in the departmental office.

International Honors Program. This program consists of forty semester courses: six semester courses beyond the basic accredited programs in addition to one semester of study abroad or two summers of study abroad. Some of the required distributional electives in Comparative Area Studies and foreign language will satisfy the humanities and social sciences requirement of the basic accredited programs. Specific program requirements and an application may be obtained in the Office of the Dean of Engineering.

Bachelor of Science in Engineering/Master of Science Program. This program provides students with an opportunity to plan a coordinated five-year program of studies in the School of Engineering leading to both the Bachelor of Science in Engineering and Master of Science degrees. Application for admission to this integrated program may be made during the junior or senior year. Provisional admission to the Graduate School may be granted when the student enrolls for the semester during which the Bachelor of Science in Engineering degree requirements will be completed. Graduate level courses during this period which are in excess of Bachelor of Science in Engineering requirements may be credited toward fulfillment of the Master of Science degree requirements.

Students must complete thirty semester hours of credit specifically approved for the Master of Science degree under the prevailing graduate rules; up to six of these hours may be thesis research if the program includes a written master's thesis. No more than nine semester hours of graduate work can be completed concurrently with completing the Bachelor of Science in Engineering degree requirements.

Bachelor of Science in Engineering/Master of Business Administration. This program provides students with an opportunity to plan a coordinated five-year program of studies leading to the Bachelor of Science in Engineering and Master of Business Administration degrees. *Admission to the business program is highly competitive and generally requires some full-time work experience or business-related summer internships.* Joint degree students are enrolled in the School of Engineering for three years and in the Fuqua School of Business for two years. Typically, four engineering courses taking during the fifth year fulfill requirements for both degrees.

Residence Requirements. At least seventeen semester courses must be completed satisfactorily at Duke. This must include the work of the final two semesters, with the following exceptions: the student who has completed more than four full semesters of work at Duke may take the last two courses elsewhere; others may take the last course elsewhere. The courses taken elsewhere must be approved in advance by the student's major advisor and academic dean.

Pass/Fail Grading Option. With the consent of the instructor and the faculty advisor, an engineering student may choose to be graded on a pass/fail basis in up to four unrestricted electives or social sciences-humanities electives within the thirty-four-course program. A student may take no more than one course on a pass/fail basis each semester.

Repetition of Courses. An engineering student who has earned a grade of D-, D, or D+ in a required mathematics course or a required engineering course may, with permission of his or her advisor, director of undergraduate studies, and academic dean, repeat the course. Both grades will remain on the student's record. Only one credit may be counted toward satisfying continuation requirements and toward fulfilling graduation requirements.

Annual Recognition. In acknowledgment of high academic achievement, recognition is given each summer to freshmen, sophomores, juniors, and seniors if the following requirements are met:

1. A normal academic load has been carried in the fall and spring terms.

2. Grades other than *P* have been earned in six semester courses.
3. No incomplete or failing grade has been received during the fall and spring terms.

The Dean's List recognizes students who earn a 3.3 average on all work in both the fall and spring terms. The Dean's List with Distinction includes students who earn a 3.6 on all work in both the fall and spring terms of an academic year.

Continuation Requirements. A student must achieve a satisfactory record of academic performance each semester and make satisfactory progress toward graduation to remain enrolled in the university.

A student must pass at least three courses in each semester, except for the first semester of the freshman year, in which at least two courses must be passed. A student who fails to meet this continuation requirement must leave the university for at least two semesters. A complete summer session may be counted as a semester. Following application for readmission, return must be approved by the dean and the director of undergraduate studies in the student's major department. If the student thereafter fails to pass three courses in a semester, permanent dismissal from the university usually results. A student who enrolls in more than four courses in a given semester and fails two or more of them will not be permitted to enroll for more than four courses in the following semester without approval of the dean. In addition, a student may be dismissed temporarily or permanently for failing to make satisfactory progress toward graduation, including satisfactory progress toward fulfillment of curricular requirements within ten semesters.

The term satisfactory progress shall be defined also by the following schedule:

1. To begin enrollment in the second year, a student must have passed 6 s.c. at Duke and earned *P*, *C*-, or better in 4 s.c.
2. To begin enrollment in the third year, a student must have passed 13 s.c. at Duke and earned *P*, *C*-, or better in 11 s.c.
3. To begin enrollment in the fourth year, a student must have passed 20 s.c. at Duke and earned *P*, *C*-, or better in 18 s.c.
4. To begin enrollment in the fifth year, a student must have passed 27 s.c. at Duke and earned *P*, *C*-, or better in 25 s.c.

Grade Requirement for Graduation. Of the thirty-four semester courses which fulfill the specified categories in the Bachelor of Science in Engineering degree requirements, thirty-two or their equivalent in number must be passed with grades of *P*, *C*-, or better.

Academic Procedures and Information



Advanced Placement

Scores on the tests discussed below and documented previous educational experience are the criteria used to determine a student's qualifications for certain advanced courses. If questions arise, students should consult the director of undergraduate studies in the appropriate department or the university registrar.

College Board Advanced Placement Program (APP) Examinations. A score of 4 or 5 on College Board Advanced Placement Program Examinations, taken prior to matriculation in college, is the basis for consideration for credit and/or placement in advanced courses in art, biology, chemistry, computer science, economics, English,* French, German, history, Latin, music, physics,† political science, psychology, and Spanish. The Department of Mathematics will consider a score of 3 for placement beyond the introductory course. The record of a student presenting such a score and desiring to continue in the same subject at Duke will be evaluated for credit and for placement in an advanced course. Departmental policies regarding advanced placement and credit may vary. In the case of French, German, Latin, and Spanish, APP scores of 4 or 5 may result in placement in courses at the 100 level; approval of the director of undergraduate studies or supervisor of freshman instruction in the appropriate department is required before final placement is made. Credit may be granted for one or two courses in each subject area, with the approval of the academic department concerned. Scores should be submitted to the Office of the Registrar no later than the end of the sophomore year. Also, see the section on residence requirements in the chapter "Degree Programs."

*The score in English Advanced Placement, although qualifying a student for advanced courses in literature, does not satisfy the requirement in writing.

†In order to receive credit for Physics 51L or 52L, a student must take a validation test during orientation.

College Board Tests. Scores on College Board Tests are the basic criteria for placement in French, German, Spanish, Latin, and mathematics. Course credit is not given for courses bypassed. The following tables will assist students in making reasonable course selections in the subjects indicated.

	<u>College Board Achievement Score</u>	<u>Placement</u>
French*	200-370	French 1
	380-440	French 12
	450-540	French 63
	550-590	French 76
	600 plus	French 100-level course
German	200-400	German 1†
	410-510	German 65-66
	520-590	German 69
	600 plus	Third year‡
Spanish*	200-420	Spanish 1
	430-490	Spanish 12
	500-570	Spanish 63
	580-620	Spanish 76
	630 plus	Spanish 100-level course
Latin	200-520	Latin 1
	530-630	Latin 63
	640 plus	Third year‡
Mathematics§	460-540	Math. 19
	550-800	Math. 31L, or with one year of high school calculus, Math. 41

*In these languages students are permitted to drop back one level without loss of credit (e.g., from 100 to 76 or from 76 to 63). No credit will be allowed for courses two levels below the achievement score (e.g., students with a score of 640 in French or Spanish could not receive credit for 63, but could for 76). In no case will credit be given for 1 and 2 to students with three or more years of high school French or Spanish.

†The first year of a language may *not* be taken for credit by a student who has completed more than two years of that language in secondary school. In rare cases, an exception may be granted with permission of the director of undergraduate studies in the appropriate department.

‡An exception may be granted in consultation with the director of undergraduate studies.

§In the absence of an achievement test score, course placement is determined by the SAT score as follows: 600 or below—Math. 19; 610-800—Math. 31L.

Newly admitted students who wish to continue the study of French, German, Spanish, or Latin begun in secondary school must take a College Board Achievement Test or College Board Advanced Placement (APP) Examination in that language by June of the senior year in secondary school. Students who plan to take mathematics at Duke are expected to present College Board SAT, Mathematics Achievement (Level I or Level II), or Advanced Placement Program (APP, either level AB or level BC) scores. Placement testing is not offered during New Student Orientation in mathematics or in languages covered by the Achievement Test or Advanced Placement Examination programs of the College Board. New students who wish to continue the study of French, German, Spanish, or Latin but who found that it was not possible due to extraordinary circumstances to take the appropriate College Board examinations, may petition to take a placement test at Duke University prior to the beginning of New Student Orientation. Petitions explaining the reason a test was not taken must be received by the Coordinator of Testing, Counseling and Psychological Services, P.O. Box 90955, by July 1. If the petition is granted, a fee will be charged to cover testing costs. Because residence halls

are not open before the beginning of New Student Orientation, students whose petitions are granted will also need to arrange accommodations in the Durham area.

All students who plan to take mathematics during their first semester at Duke, and who do not submit the College Board SAT or Achievement Test or Advanced Placement Program score in mathematics, should consult with the supervisor of freshman instruction in mathematics during New Student Orientation. New students who have been placed in Mathematics 19 or 31 on the basis of College Board SAT, Achievement, or Advanced Placement Examinations but who believe that their background in mathematics justifies a higher placement, should also confer during New Student Orientation with the supervisor of freshman instruction or with the director of undergraduate studies in the department of mathematics.

International Entrance Examinations. Duke University recognizes the International Baccalaureate Program, the French Baccalaureate, the British A-Level Examinations, the Hong Kong A-Level Examinations, the German Abitur and the Swiss Federal Maturity Certificate. Advanced standing credit and/or placement can be awarded upon the recommendation of the concerned Duke department. Scores acceptable for consideration are determined by the faculty and evaluated by the university registrar.

Placement in Languages Other Than French, German, Spanish, and Latin. Students who wish to continue in any language other than French, German, Spanish, or Latin should consult with the appropriate director of undergraduate studies. In the case of Russian, the department offers an examination which is used in conjunction with other criteria for placing students at the appropriate level.

Reading Out of Introductory Courses. Students demonstrating academic ability may be granted the option of reading out of an introductory or prerequisite course in order to allow them to advance at their own pace to upper-level work. No course credit may be earned by reading out. Reading for a course and auditing are mutually exclusive procedures. Students should consult with the appropriate directors of undergraduate studies who must approve the proposed program of reading. Students may be certified for advanced course work by passing a qualifying examination prepared by the department. When an advanced course is completed, an entry is made on the permanent record that the qualifying examination was passed, but no course credit is awarded.

Transfer of Work Elsewhere

Work Done Prior to Matriculation at Duke. First-year Duke students may submit for evaluation college courses taken after the commencement of the student's junior year of high school. Students transferring from a degree program in another accredited institution may be granted credit for up to seventeen semester-course credits. Ordinarily, students will not be awarded more than four semester-course credits for one semester's work unless they have satisfactorily completed more than the normal course load at the institutions from which they are transferring credit. Courses taken at other institutions prior to matriculation at Duke are evaluated by the university registrar and the faculty.

Evaluation of Work Taken Elsewhere. Courses in which grades of less than C- have been earned are not accepted for transfer credit; students seeking transfer credit for courses in which they earned a P grade must present official verification that the P is equivalent to at least at C- grade. The semester-course unit of credit awarded at Duke for satisfactorily completed courses cannot be directly equated with semester-hour or quarter-hour credits. Credit equivalency is determined by the university registrar. All courses approved for transfer are listed on the student's permanent record at Duke, but grades earned are not recorded. Further information is available from the university registrar.

College-level courses taken during the high school years are eligible for consideration for transfer of credit to Duke upon receipt of the following documentation: an official transcript of all college courses, sent directly from the college(s) attended to Duke; official notification by letter from the high school principal or guidance counselor that the credit earned was not used to meet high school diploma requirements; an official letter of verification from each college attended indicating that all courses were taken on the college campus, taken in competition with degree candidates of that college, taught by regular members of the college faculty, and were a part of the normal curriculum of the college. Course descriptions of all courses taken are required for evaluation. By policy, all precalculus and English composition courses taken during the high school years do not transfer to Duke.

After matriculation as a full-time degree candidate at Duke University, a student in Trinity College of Arts and Sciences may receive credit toward the Bachelor of Science or Bachelor of Arts degree for two courses taken at another institution in the United States, whether in the summer while regularly enrolled at Duke, while withdrawn voluntarily from the college, or while on leave of absence for personal, medical, or financial reasons. Trinity College students, when eligible, may also receive transfer credit for up to ten courses taken in an approved program for study abroad (see the section on Study Abroad). In some cases, transfer credit may be received for a maximum of four of the final eight courses toward the bachelor's degree (see the section on Residence Requirements). Once matriculated, however, a student may not receive credit for more than a *total* of ten transfer courses toward the Bachelor of Science or Bachelor of Arts degree. Full-time degree candidates in the School of Engineering may receive credit toward the Bachelor of Science in Engineering degree for a maximum of four courses taken at another institution. Ordinarily, no credit will be accepted for course work taken while a student is withdrawn involuntarily. For purposes of this regulation, advanced placement and interinstitutional credit (see the section on agreement with neighboring universities) are not considered as work taken at another institution.

Students may not transfer credit from two-year colleges after completing their sophomore year. At least half the courses submitted toward fulfillment of a student's major field must be taken at Duke, but departments may make exceptions to this rule in special circumstances. No credit is given for work completed by correspondence, and credit for not more than two semester courses is allowed for extension courses.

Approval for Courses Taken Elsewhere. Approval forms for Duke students taking courses at institutions other than Duke may be obtained from the offices of the academic deans. Students wishing to transfer credit for study at another accredited college while on leave or during the summer must present a catalog of that college to the appropriate dean and director of undergraduate studies and obtain their approval *prior* to taking the courses.

Advising

Students and their advisors confer when necessary, but they should confer at least once before every registration period to review goals, plans for achieving them, and any problems encountered or anticipated. Before declaring a major in Trinity College, students confer with the premajor advisor, the academic dean for premajor students, or the academic dean in the division of their interests. Upon declaring a major, the student is assigned a faculty advisor; the academic dean for that division is also available for consultation. In the School of Engineering, the advisor's signature is necessary for registration and all course changes. Much good advising is informal and occurs in conversation with members of the faculty. Students have the responsibility to understand and meet the requirements for the curriculum under which they are studying and should seek advice as appropriate.

Registration

Students are expected to register at specified times for each successive term. Prior to registration each student receives special instructions and registration materials. Students prepare a course program, and submit it at an appointed time to their advisors for review. In the School of Engineering, the schedule must be approved by the advisor.

Students who expect to obtain certification to teach in secondary schools should consult an advisor in the education program prior to each registration period to ensure that they are meeting requirements for state certification and that they will have places reserved for them in the student teaching program.

Those who register late are subject to a \$50 fine. In the case of students enrolled in Continuing Education, late fees are assessed after the first day of classes. Students who fail to register for the fall or spring semester are withdrawn and must apply for readmission if they wish to return; they also forfeit their registration deposits unless they indicate at the time of registration their intention not to continue in the university the following term. Those students who have not paid any fees owed to or fines imposed by the university (such as laboratory fees, library fines, and parking fines) by the date specified for registration for the following term will not be permitted to register for the following term until such fees and fines have been paid in full, notwithstanding the fact that the student may have paid in full the tuition for the following term.

Students planning to register for a course under the reciprocal (interinstitutional) agreement must have the course approved by the appropriate director of undergraduate studies and their academic dean. Further information about registration procedures once approval is given may be obtained from the Office of the Registrar. See the chapter "Special Programs" for information regarding the reciprocal agreement with neighboring universities.

Duke Identification Card and Term Enrollment. Undergraduate students are issued identification cards which they should carry at all times. The card is a means of identification for library privileges, university functions, and services available to university students. Students are expected to present their card on request to any university official or employee. The card is not transferable, and fraudulent use may result in loss of student privileges or suspension. Loss of the card should be reported immediately to the Office of the Registrar where new ones can be obtained for \$10. Official enrollment is required for admission to any class. Failure to report, or to account beforehand for an absence, entails a loss of registration in courses.

Concurrent Enrollment. A student enrolled at Duke may not enroll concurrently in any other school or college without special permission of the appropriate academic dean. See, however, the statement regarding the reciprocal agreement with the University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University at Raleigh.

Course Changes after Classes Begin in the Fall and Spring Terms. During the drop/add period changes may be made in course schedules.

In Trinity College of Arts and Sciences, students may drop and add courses during the first week of classes in the fall and spring terms at their own discretion; during the second week of the drop/add period they may drop courses at their own discretion, but the approval of the appropriate instructor is required for adding a course. After the drop/add period no course may be added; also, a course may not be changed to or from the pass/fail or audit basis. To withdraw from a course, students must obtain permission from their academic deans, and for reasons of course overload the academic dean may give permission up to midterm. Ordinarily, courses may not be discontinued after midterm. In extraordinary circumstances, however, e.g., for reasons of health, the academic dean may allow a student to withdraw. After the drop/add period, the student receives a *WP* grade (withdraw passing) or *WF* (withdraw failing) from the instructor.

Course work discontinued without the dean's permission will ordinarily result in a grade of F.

Within the School of Engineering, the approval of the advisor is necessary for dropping or adding courses after classes begin. After the drop/add period no course may be added, and in order to withdraw from a course students must obtain permission from their academic dean. Factors to be considered by the dean include health, necessary outside work, and, up to the time midterm grades are issued, a course overload. Until the last four weeks of classes in the semester, the instructor must certify the student's standing in the course as satisfactory or as failing. In the former case a WP will be entered on the permanent record and in the latter, a WF. During the last four weeks of classes in any semester, or the equivalent in the summer terms, W will be assigned if, in the judgment of the student's dean, compelling and extraordinary circumstances make it necessary for the student to drop the course; otherwise, the course must be continued to the end of the semester. A course discontinued without approval will result in a grade of F.

When students note an error in their course schedules, they should consult with their academic dean.

Course Changes for the Summer Terms. Course changes are accomplished through ACES, the telephone registration system. Duke students who are blocked from continuing into a summer term must see their academic dean.

Courses may be added before or during the first three days of the term (see also the section on late registration and payment). After the third day of the term, no course may be added. Prior to the first day of the term, students may drop a course or courses for which they have registered without penalty. During the first three days of the term, students will be charged \$150 per course (\$75 per half-course or per audited course) for dropping a course or courses if this results in any reduction in course load for the term. With the permission of the academic dean a course may be dropped until the end of the fourteenth day of a regular summer term (eleventh day at the Marine Laboratory); the instructor then assigns a WP or WF grade. Course work discontinued without the approval of the dean will ordinarily result in a grade of F. (See also the section on Withdrawal Charges and Refunds.)

Course Load and Eligibility for Courses

Students are reminded that it is their responsibility to be certain that their course load conforms with academic requirements. The normal and expected course load in the fall or spring term is four semester courses. Students should take note that two additional semester credits are needed in order to meet the thirty-four (34) semester-course requirement for graduation. To take fewer than four or more than five semester courses, students must have the approval of their academic deans. No student, however, may take more than six courses in any semester. With the approval of their academic dean, seniors in Trinity College and the School of Engineering who need fewer than eight semester courses for graduation requirements may take an underload.

Maximum course program for one term of the summer session is two courses, one of which may be a laboratory course. Students in the School of Engineering may enroll in two laboratory courses. In addition, a student may enroll in a physical education activity or dance activity course for one-half course credit.

Self-pacing during a given calendar year (two regular semesters plus two Duke summer terms) is possible with the approval of the student's academic dean and faculty advisor (and in consultation with the Office of Undergraduate Financial Aid, if the student is receiving monetary support from the university). Prior to the beginning of a semester, a student may apply to take fewer than four courses for one or more semesters in a given calendar year after the freshman year, providing the student can meet the continuation requirements described in the chapter "Degree Programs." Advanced

placement credits and summer work taken elsewhere are excluded when minimum annual continuation requirements are considered under this plan.

Eligibility for Courses. The rules established by the Graduate School provide that juniors and well-qualified sophomores may enroll in a 200-level (senior-graduate) course if they have obtained written consent of the instructor, as well as that of the director of graduate studies in the department concerned. Undergraduate students may not enroll in 300- or 400-level courses.

Seniors who, at the beginning of the final term, lack no more than three semester courses toward the fulfillment of the requirements for the Bachelor of Arts or Bachelor of Science degree may enroll in graduate courses, for a maximum course load of five semester courses. Admission to the Graduate School is necessary.

Students may not register for two courses meeting at the same time. In Trinity College no course may be repeated for credit or a grade if a C- or higher has been earned previously, except where noted in the course description. Physical education activity courses may be repeated, but without graduation credit. A course previously passed, however, may be audited.

Students who receive a D-, D, or D+ in any course in Trinity College are allowed to repeat the course at Duke. The grade earned in the repeated course as well as the grade earned originally appear on the transcript, the former identified as a repeat; both grades count in the grade point average, but the credit for only one counts toward the required number of courses for continuation and the thirty-four (34) courses required for graduation. Forms requesting to repeat a course are available in the offices of the academic deans.

Course Audit

Students who audit a course submit no daily work and take no examinations. They do not receive credit for the course. With the written consent of the instructor, a full-time degree student is allowed to audit one or more courses in addition to the normal program. Physical education activity, studio art, applied music, and dance technique/performance courses may not be audited. In the fall or spring term, a part-time degree student may audit courses by payment for each course audited. In a summer term, a student carrying two courses for credit may be given permission to audit, without additional fees, nonlaboratory courses with the above exceptions. A student in a summer term carrying less than a full program for credit may secure permission to audit (above exceptions apply) but is required to pay half the university fee for the course. After the drop/add period in any term, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may be reclassified as an auditor. A student may not repeat for credit any course previously audited.

Courses may be audited by faculty members, staff, alumni, employees and their spouses, as well as spouses of currently enrolled students, and members of the Institute for Learning in Retirement; courses audited on the Microelectronics Center of North Carolina (MCNC) Network may be audited without concurrent enrollment in another course. Formal application is not necessary; written permission from the instructor must be obtained and a course card must be signed by the director of the Office of Continuing Education. Consult the chapter "Financial Information" for the appropriate fee schedule. Auditors must register on the Friday before classes begin.

Independent Study

Independent study enables a student to pursue individual research and reading in a field of special interest under the supervision of a member of the faculty. A student—with the approval of an advisor, the instructor, and the director of undergraduate studies in the instructor's department—may enroll in independent study for any term at Duke.

In Trinity College, instructors of independent study courses are expected to meet with the students enrolled at least once every two weeks during the fall or spring and at least once each week during a summer term.

House Courses

House courses, offered in the fall and spring terms, are intended to provide academic experiences that are not offered by regular departmental courses. A house course must be hosted by a residential unit, sponsored by a faculty member in Trinity College of Arts and Sciences, reviewed by the department of that faculty member, and approved by the Committee on Courses of Instruction of the Arts and Sciences Council. House courses carry a half-course credit. In the School of Engineering, house courses cannot be used to meet degree requirements. In Trinity College not more than two semester-course credits earned in house courses can be counted toward the course requirement for graduation. House courses do not count toward other requirements. Grades are submitted only on the pass/fail basis. The academic deans can provide further details.

Submission of Term Paper

Students who wish (under unusual circumstances) to submit a single paper for credit in more than one course must receive prior written permission from each course instructor. The student must indicate the multiple submission on the title page of the paper.

Declaration of Major or Division in Trinity College of Arts and Sciences

Before declaring a major or interdepartmental concentration in Trinity College, students work with their premajor advisors and with other members of the faculty and staff to develop a "long-range academic plan," which outlines academic objectives and plans for meeting goals. The plan should describe the proposed major program, related classroom and outside experiences, and the general pattern of elective courses, as well as the means by which the student will meet established college requirements for graduation. Although students may declare a major as early as the spring of the first undergraduate year, all students must secure formal approval of their long-range plans and must declare their majors before the last day of classes in their fourth undergraduate semester. Forms for filing the official long-range plan and for registering the initial declaration of major are available in the Premajor Advising Center.

After declaring a major, students are assigned an advisor in the department of the major and an academic dean in that division. Students who, having already declared a major, wish to change it should do so in the Office of the Registrar.

A student may declare an interdepartmental concentration after receiving the approval of the directors of undergraduate studies of the departments involved; they or other advisors assist the student in preparing a program of course work. The program, which must be planned early in the undergraduate career, must consist of at least three courses beyond the introductory level in each of at least two departments. One of the departments should be identified as primarily responsible for the student's advising. A copy of the plan for the program, with a descriptive title which will appear on the student's permanent record, should be presented, along with the written approval of the directors of undergraduate studies, to the appropriate academic dean. A student who declares an interdepartmental concentration must satisfy all other requirements for Program I.

A student who wishes to declare a second major should do so in the Office of the Registrar before registering for the final term. If the student's second major is not offered

within the degree to be granted for completion of the first major, a notation of the second major will appear on the transcript. Majors offered within each degree are listed below:

Bachelor of Arts. African and Afro-American studies, art history, biology, biological anthropology and anatomy, Canadian studies, chemistry, classical languages, classical studies, comparative area studies, computer science, cultural anthropology, drama, economics, English, environmental science and policy, French studies, geology, Germanic languages and literature, history, Italian studies, literature, mathematics, medieval and Renaissance studies, music, philosophy, physics, political science, psychology, public policy studies, religion, Russian, sociology, Spanish, visual arts, and women's studies.

Bachelor of Science. Biological anthropology and anatomy, biology, chemistry, computer science, geology, mathematics, physics, and psychology.

Changes in Status

Withdrawal and Readmission. Students who wish to withdraw from the college must give official notification to their academic dean. Notification must be received prior to the beginning of classes in any term or tuition will be due on a pro rata basis. (See the section on refunds in the chapter "Financial Information.") For students withdrawing on their own initiative after the beginning of classes and prior to the last four weeks of regular classes in the fall or spring term, or before the last two weeks of regular classes in a summer term, a *W* is assigned in lieu of a regular grade for each course. After these dates an *F* grade is recorded unless withdrawal is caused by an emergency beyond the control of the student, in which case a *W* is assigned by the student's academic dean.

Students may be involuntarily withdrawn for academic reasons, financial reasons, and violation of academic regulations. The expectations pertaining to each are found in the chapters "Degree Programs," "Financial Information," and this chapter, "Academic Procedures and Information."

Applications for readmission are made to the appropriate school or college. Each application is reviewed by officers of the school or college to which the student applies, and a decision is made on the basis of the applicant's previous record at Duke, evidence of increasing maturity and discipline, and the degree of success attendant upon activities during the time away from Duke. Students who are readmitted usually cannot be housed on campus.

Applications for readmission must be completed by November 1 for enrollment in the spring, by April 1 for enrollment in the summer, and by July 1 for enrollment in the fall.

Leave of Absence. An upperclassman in good standing may apply in writing to the appropriate academic dean to take a leave of absence for one or two semesters; the deadline for application for a leave is the end of the registration period for the semester immediately preceding the leave. Students returning from approved medical, financial, personal, or study abroad leaves and desiring housing on campus will be placed in the general housing lottery, provided they have submitted the appropriate information to the Office of Residential Life by their published deadline noted above and provided that they lived on campus before taking their approved leave. Unless an exception for an emergency is authorized by the students' academic deans, students applying after the course registration cited above will lose their priorities in university housing for the period following the leave.

Registration materials will be mailed to a student on leave, but final registration is, of course, contingent upon the student's fulfilling the terms of the leave. A student failing to register while on leave will be withdrawn from the university and will have to apply for readmission.

A student who undertakes independent study under Duke supervision and for Duke credit is not on leave of absence even if studying elsewhere. The student registers

at Duke as a nonresident student and pays the appropriate fees or tuition at Duke. This also applies to Duke programs conducted away from the Durham campus.

Transfer between Duke University Schools. Students in good standing may be considered for transfer from one Duke undergraduate school or college to another, upon written application and request for a letter of recommendation from their academic dean. The review of requests to transfer involves consideration of a student's general academic standing, citizenship records, and relative standing in the group of students applying for transfer. The school or college to which transfer is sought will give academic counseling to a student as soon as intention to apply for transfer is known, although no commitment will be implied.

A student may apply to transfer at any time prior to receiving a baccalaureate degree. A student transferring to Trinity College of Arts and Sciences from the School of Engineering, prior to receiving a baccalaureate degree, may not use more than six professional school credits toward the Bachelor of Arts or Bachelor of Science degree. If admitted after having earned a baccalaureate degree, a student must complete in Trinity College a total of seventeen additional courses. Transfer credit, AP credit, or courses previously used to satisfy requirements for the degree in engineering cannot be counted.

Full-Time and Part-Time Degree Status. Ordinarily candidates for degrees are expected to enroll for a normal course load each semester. Students who need to change from full-time to part-time status must request permission from their academic dean. Except for extraordinary circumstances, such permission is given only to students for the final semester of their senior year. So that the number of part-time students can be taken into account in enrollment and budget decisions, seniors must plan ahead and register their intention to be part-time one year in advance of the semester of part-time status. Part-time students may register for not more than two courses (or two courses and a half-credit physical education activity). Part-time students may not live in university housing.

Resident and Nonresident status. See the chapter "Campus Life and Activities."

Nondegree to Degree Status. A nondegree student must apply to the Office of Undergraduate Admissions for admission to degree candidacy.

Class Attendance, Excused Absences, and Tests

Responsibility for class attendance rests with the individual student, and since regular and punctual class attendance is expected, the student must accept the consequences of failure to attend. Instructors may refer to the student's academic dean a student who is, in their opinion, absent excessively. As a rule, absences from required classes and tests are excused only for illnesses certified by a medical official of the University or for authorized representation of the university in out-of-town events. Officials in charge of groups representing the university are required to submit the names of students to be excused to the appropriate deans' offices forty-eight hours before absences are to begin.

Class times are officially scheduled at registration unless designated "to be arranged" (TBA). No class time may be changed without prior permission of the University Schedule Committee. Within-class tests (except for the final) are to be given at the regular class meeting times. Exceptions are made for block tests that have been approved by the University Schedule Committee.

Incomplete Course Work

If because of illness, emergency, or reasonable cause a student cannot complete work for a course, the student may request in writing to his or her academic dean the assignment of an I (incomplete) for the course. If the request is approved by the instructor

in the course and by the student's academic dean, then the student must satisfactorily complete the work prior to the last class day of the fifth week of the subsequent semester or a grade of *F* will be recorded for the course. If continuation is in question, then an *I* will have to be completed with a passing grade prior to the first day of classes for the following semester. See the section on quality of work in the chapter "Degree Programs." An *I* taken in the fall semester must be resolved in the succeeding spring term; an *I* taken in the spring or summer must be completed in the following fall term. A student not enrolled in the university during that subsequent semester will have until the end of the fifth week of the next semester of matriculation to clear the *I*. An *I*, once recorded, will remain permanently on the student's record, even after the final grade is subsequently assigned for the course. In addition, an *I* cancels eligibility for annual honors, i.e., the Dean's List and Dean's List with Distinction. If a student whose work is incomplete is also absent from the final examination, an *X* is assigned for the course. Students may not complete work in a course after graduation. For a discussion of the possible impact of an *I* grade on continuation, see the sections on satisfactory performance each term in the chapter "Degree Programs."

Final Examinations and Excused Absences

The times and places of final examinations for the fall and spring terms are officially scheduled by the University Schedule Committee, generally according to the day and hour of the regular course meeting; changes may not be made in the schedule without the approval of the committee. If a final examination is to be given in a course, it will be given at the officially scheduled time. Take-home examinations are due at the regularly scheduled hour of an examination, based on the time period of the class. In fall or spring courses where final examinations are not scheduled, examinations may not be given in the last week of classes. In the summer session, final examinations are held on the last two days of each term as specified in the summer session brochure calendar. Final examinations for short courses are held on the last day of the course.

No later than the end of the first week of classes of the fall and spring term, the instructor is required to announce plans for the final examination exercise. Unless departmental policy stipulates otherwise, the form of the final exercise is determined by the instructor. However, a final written examination may not exceed three hours in length and a final take-home examination may not require more than three hours in the actual writing.

If a student is absent from a final examination, an *X* is given instead of a final grade unless the student's grade in the class is failing, in which case the instructor may submit an *F*. The student must present an acceptable explanation for the absence to the appropriate academic dean within forty-eight hours after the scheduled time of the examination. The *X* is converted to an *F* if the academic dean does not approve the absence. If the absence is excused by an academic dean, the student arranges with the dean and the instructor for a make-up examination to be given at the earliest possible time. An excused *X* not cleared by the end of the fifth week of the following semester is converted to an *F*. A student not enrolled in the university during that following semester has until the end of the fifth week of the next semester of enrollment to clear the *X* unless an earlier deadline has been established by the instructor and the academic dean.

Grading and Grade Requirements

Final grades on academic work are sent to students after the examinations at the end of each term. Midterm advisory grade reports for freshmen are issued in the fall and spring.

Passing Grades. Passing grades are *A*, exceptional; *B*, superior; *C*, satisfactory; *P*, passing (see pass/fail option below); and *D*, low pass. These grades may be modified

by a plus or minus. A Z may be assigned for the satisfactory completion of the first term of a two-course sequence, and the final grade for both courses is assigned at the end of the second course of the sequence.

Although the *D* grade represents low pass, in Trinity College not more than two courses passed with *D* grades may be counted among those required for year-to-year continuation or among the thirty-four courses required for graduation. Courses for which a *D* grade is earned, however, satisfy other requirements. For information on repeating a course with a *D* grade, see the section on course load and eligibility for courses in the chapter.

Failing Grades. A grade of *F* or *U* (see pass/fail option below) indicates that the student has failed the course. The grade is recorded on the student's record. If the student registers for the course again, a second entry of the course and the new grade earned are made on the record, but the first entry is not removed.

Pass/Fail Option. With the consent of the instructor and faculty advisor, a student who has declared a major may register for grading on a pass/fail basis in one elective, nonmajor course each term. No degree requirements, except the requirement for thirty-four course credits and the continuation requirements, may be met by a course passed under the pass/fail option, unless the course is offered only on that basis. Preceptorials, discussion sections, seminars, and tutorials may not be taken on the pass/fail basis, unless the course is offered only on that basis.

After the drop/add period in any term, no changes from pass/fail to regular status, or from regular to pass/fail status, are permitted in any course. A *P* may not be converted subsequently to a regular letter grade, and the course may not be retaken under the regular grading system.

Grades When Absent from Final Examination. See the section on final examination and excused absences in this chapter.

Effects of Incomplete Work. For purposes of determining satisfactory progress each term and toward graduation, incomplete work in a course indicated by a grade of *I* or *X* is considered a failure to achieve satisfactory performance in that course. Furthermore, an incomplete during the academic year cancels eligibility for annual honors; i.e., Dean's List and Dean's List with Distinction. See the section on incomplete work in this chapter.

WP, WF, and W Grades, and WE Designation. *WP* and *WF* grades may be issued if a student withdraws from a course after the drop/add period. (See the sections on course changes in this chapter.) *W* grades are issued if a student withdraws *from the university* before the last four weeks of regular classes in the fall or spring semester, or before the last two weeks of classes in a regular summer term. (See the section on withdrawal and readmission in this chapter.)

WE indicates correction of an error in registration. It is not a grade.

Academic Recognition and Honors

In determining a student's eligibility for annual recognition and graduation honors, the colleges consider only grades earned in Duke courses, including courses taken in the university's own study abroad programs and under the interinstitutional agreement.

Annual Recognition. In acknowledgment of high academic achievement, recognition is given each summer to freshmen, sophomores, juniors, and seniors if the following requirements are met:

1. A normal academic load has been carried in the fall and spring terms.
2. Grades other than *P* have been earned in six semester courses.

3. No incomplete or failing grade has been received during the fall and spring terms.

The Dean's List recognizes students who earn a 3.3 average on all work in both the fall and spring terms. The Dean's List with Distinction includes students who earn a 3.6 average on all work in both the fall and spring terms of an academic year.

Graduation Recognition. Academic excellence at graduation has been recognized at Duke at the departmental level by graduation with distinction in a disciplinary or interdisciplinary program and at the college level by Latin honors. These traditional forms of recognition continue. Beginning with students who entered Duke as freshmen in the summer or fall of 1988, a third form of recognition is available which combines features of both graduation with distinction and Latin honors—the honors project.

Graduation with Distinction. Academic departments and interdisciplinary programs of the colleges have programs leading to graduation with distinction. While these programs may vary in specific details, all have common basic features and all have been approved by the Honors Committee of the Arts and Sciences Council. To be eligible to begin a program leading to graduation with distinction, a student must show promise of achieving by the time of graduation at least a *B* average in the major field. In addition, departments may have special requirements regarding standards of performance. In the School of Engineering, for example, some departments require at least a *B* average in all subjects and may have other requirements.

Departments or interdepartmental honors committees may invite a student at the end of the sophomore or junior year to enter the Graduation with Distinction Program. The student typically participates in a seminar in the junior or senior year and/or a directed course of reading, laboratory research, or other independent study. The student must eventually present the results of individual research and study in a piece of writing judged by a departmental committee to be distinguished. The student's achievement, including the paper, is assessed by a faculty committee, and if the student has at least a *B* average in the major field, the committee may recommend that the student be graduated with distinction in the major field. A student engaged in an interdisciplinary program, including Program II, must attain an overall *B* average for courses taken in the departmental area of concentration or special study; achievement is assessed by an interdepartmental honors committee established by the directors of undergraduate studies in the departments concerned. A student may also be graduated with distinction in a program of studies that does not offer a major. In such a program the student must present a *B+* grade point average in the program field and a *B* average in all subjects. The papers of students in special programs will be evaluated by a committee drawn from the faculty within those programs. Interested students should consult appropriate directors of undergraduate studies or program directors.

Latin Honors by Overall Academic Record. Overall academic excellence over the entire college career traditionally has been recognized by the designations *cum laude*, *magna cum laude*, and *summa cum laude*. At Duke students who earn the following averages for approved course work are graduated with honors: 3.4, *cum laude*; 3.7, *magna cum laude*; 3.9, *summa cum laude*.

Latin Honors by Honors Project. Latin honors may also be awarded by Trinity College to students who successfully complete an honors project in an individual department. Honors projects must be approved by departmental faculty at successive stages during a student's junior and senior years. A candidate for Trinity College honors by honors project must have an overall grade point average of 3.3 at the beginning and end of the project to qualify for departmental nomination. Departmental procedures governing honors projects and the nomination of students for Latin honors by honors project must be approved in advance by the Honors Committee of the Arts and Sciences Council.

Other Honors. Elections to the national freshman honorary society, Phi Eta Sigma, are made at the end of the fall and spring semesters. Students who earn a 3.5 average in

four or more semester courses in their first semester of enrollment, or those whose cumulative average at the end of their second semester is 3.5 or above in a program of eight or more semester courses, are invited to membership.

Elections of undergraduate students in Trinity College and the School of Engineering to membership in the national honor society, Phi Beta Kappa, are held in the spring and fall. A review of the academic record of all prospective candidates is conducted in the junior and senior years as well as in the term following graduation. (Doctoral students, on the other hand, are nominated by their department.) Eligibility for election is determined not by the university, but by the local chapter of the society. Eligibility is based on earned credits taken on the regular grading system (A-F). The total number of persons elected annually is limited by bylaw to 10 percent of the graduating class. Eligibility requires a course of study with the breadth that characterizes a liberal education. The Program I curriculum meets those expectations; Program II and Engineering students must demonstrate comparable breadth in order to be eligible. Inquiries concerning distribution requirements for students in the School of Engineering should be directed to Professor Rhett George, Department of Electrical Engineering. All other inquiries may be directed to the Secretary of Phi Beta Kappa, Box 99352, Duke Station, Durham, North Carolina 27708.

Membership to the national academic honors organization, the Golden Key National Honor Society, is by invitation to the top 15 percent of university juniors and seniors in all fields of study. Chapter activities are service and interaction oriented, and members are encouraged to be active participants. Scholarships are awarded annually and career assistance is provided.

Elections to the national engineering honor society, Tau Beta Pi, are held in the fall and spring. Eligibility is determined on the basis of distinguished scholarship and exemplary character. Engineering students whose academic standing is in the upper eighth of the junior class or the upper fifth of the senior class have earned consideration by their local chapter. Inquiries may be directed to the Advisory Board, Tau Beta Pi, School of Engineering, Box 90271, Duke University, Durham, North Carolina 27708.

International Fellowships. Students interested in various prestigious fellowships for graduate study (for example, the Fulbright-Hays, Luce, Marshall, Rhodes, and Winston Churchill) should consult the academic dean in charge of fellowships, 04 Allen Building. Specific information about deadlines and procedures is available through that office.

Notification of Intention to Graduate

The Diploma Card for students in Trinity College of Arts and Sciences and the School of Engineering is official notification that they expect to have completed all requirements for the degree and to receive the diploma on a particular graduation date. It is the responsibility of students to file the card on or before established deadlines. For students in Trinity College, the cards, to be filed during the fall registration period, are available in the college recorder's office; in the School of Engineering, the dean's office.

Commencement

Graduation exercises are held once a year in May when degrees are conferred upon and diplomas are issued to those who have completed degree requirements by the end of the spring term. Those who complete the requirements by the end of the summer term or by the end of the fall term receive diplomas dated September 1 or December 30, respectively. There is a delay of one month to two months in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Prizes and Awards

The achievements of undergraduate students are recognized in various fields of activity. The following prizes suggest the range of recognition. According to current university policy, some of the scholarships listed must be awarded in honorary form unless the students chosen are on financial aid, in which case the scholarships will be incorporated in the winners' financial packages. These scholarships are identified by an asterisk (*).

The Edward H. Benenson Awards in the Arts. These awards of \$300 to \$3,000 are granted annually through the generosity of Duke alumnus and trustee Edward H. Benenson. Funds are awarded for fees, equipment, supplies, travel, production, and other educational expenses for projects in art, music, drama, dance, creative writing, and film/video proposed by undergraduates and graduating seniors of Trinity College and the School of Engineering. Application forms and instructions are available in February from the Institute of the Arts, 109 Bivins Building.

The Louis Sudler Prize in the Arts. An award is presented annually by the Institute of the Arts to a graduating senior who, in the opinion of a special institute committee, has demonstrated the most outstanding achievement in artistic performance or creation. The prize of \$1,000 was established in 1983 through the generosity of Louis C. Sudler, Chicago, Illinois.

The Sirennu WuDunn Memorial Scholarship Fund. This fund was created by the family and friends of Sirennu WuDunn. An award is made annually to a student who best embodies Sirennu's ideals and interests and who has demonstrated academic excellence and an interest in Asian culture.

The Edward C. Horn Memorial Prize for Excellence in Biology. Given each year to a graduating biology major who has shown, in the opinion of the zoology faculty, the highest level of academic achievement and promise, this prize is offered in memory of Professor Edward C. Horn. It is a tribute to his warm regard for students and faculty and his appreciation of scholarly excellence. The prize consists of books appropriate to the student's field of interest.

CRC Outstanding Freshman Chemistry Award. A copy of the Chemical Rubber Company's *Handbook of Chemistry and Physics* is awarded annually to a freshman student in chemistry. The basis for selection by a faculty committee is academic excellence.

American Chemical Society Undergraduate Award in Analytical Chemistry. This prize is given annually by the Analytical Division of the American Chemical Society to an undergraduate student in analytical chemistry. The basis for selection is academic excellence and laboratory proficiency. The prize is a subscription to the journal *Analytical Chemistry* published by the American Chemical Society.

North Carolina Institute of Chemists Award. This prize is awarded annually to a graduating senior who has demonstrated a record of leadership and scholastic achievement and who has shown potential for advancement of the chemical and chemical engineering profession.

The Chemistry Department Award. This prize is awarded annually to an outstanding senior chemistry major in the Bachelor of Science degree program. The basis for selection is the student's independent research and interest in pursuing advanced work in chemistry. The prize is a one-year subscription to an appropriate journal.

The Merck Index Award. This prize is awarded annually to one or more graduating chemistry majors intending to pursue a career in medicine. Selection, by a faculty committee, is based on scholastic excellence. The prize consists of a copy of the *Merck Index* presented by Merck and Co., Inc.

The David Taggart Clark Prize in Classical Studies. This prize derives from income earned on the generous bequest (1956) of Professor David Taggart Clark, classicist and economist. It is awarded to the senior major in Greek, Latin, or Classical Studies who is judged to have written the best honors essay of the year, and consists of an important book or books in the field of classics.

The James B. Rast Memorial Award in Comparative Anatomy. The parents and friends of James Brailsford Rast, a member of the Class of 1958 of Duke University, endowed this award in his memory. The award, consisting of the *Atlas of Descriptive Human Anatomy* by Sobotta and bearing the James B. Rast Memorial bookplate, is given annually to the student who demonstrates the greatest achievement in the study of comparative anatomy.

John M. Clum Distinguished Drama Graduate Award. This award is named for the distinguished founder of the Duke University Drama Program. The award recognizes an outstanding graduating senior who has made extraordinary contribution to the life of the program, and who has exhibited outstanding personal and professional qualities.

The Reynolds Price Award for Script-writing. This award is presented annually by the Drama Program to a Duke undergraduate for the best original script for stage, screen, or television.

The Augusto Lentricchia Award for Excellence in Directing. A prize of \$250 is awarded annually to an undergraduate of Duke University for sustained excellence in directing for the stage or screen. The award is sponsored by the Drama Program through a continuing gift from Frank Lentricchia, who named the award in memory of his paternal grandfather, a man of few, but penetrating words, and a keenly observant and extraordinarily disciplined poet.

The Tommaso Iacovella Award for Excellence in Acting. A prize of \$250 is awarded annually to an undergraduate of Duke University for sustained excellence in acting for the stage or screen. The award is sponsored by the Drama Program through a continuing gift from Frank Lentricchia, who named the prize in memory of his maternal grandfather, a captivating and exuberant storyteller who inspired him with his charismatic and surprising stories.

The Winfred Quinton Holton Prize in Primary Education. This prize was established in 1922 by gifts of Holland Holton, Class of 1907, and Lela Young Holton, Class of 1907, in memory of their son, Winfred Quinton Holton, with the income to be used to provide a prize for investigative work in primary education. This prize may be made annually. Competition is open to Duke seniors and graduate students who are eligible to obtain certification to teach. A student who wishes to be considered for the prize must submit a paper to be judged by a faculty committee in the Program in Education.

The Robert J. Niess/Alexander Hull Award in French. Given each year to an outstanding French major in honor of Robert J. Niess, professor of French at Duke University from 1972 to 1981 and Alexander Hull, associate professor of French at Duke University from 1962 to 1993.

The William T. Laprade Prize in History. This prize is offered in honor of William T. Laprade, who was a member of the Department of History at Trinity College and Duke University from 1909 to 1953, and chairman of the department from 1938 to 1952. It is awarded to a senior who is being graduated with distinction and whose senior essay in history has been judged to be unusually meritorious.

The Bascom Headen Palmer Literary Prize. This prize was established in honor of Bascom Headen Palmer's achievement as recipient of the Hesperian Literary Society Medal in 1875, his senior year in Trinity College. It recognizes the best senior honors thesis in literary study each year.

Julia Dale Prize in Mathematics. This is an annual prize of at least \$200. The winner is selected by the Department of Mathematics on the basis of excellence in mathematics. In some years first and second prizes are given.

Karl Menger Award. This is an annual cash award. The winner is selected by the Department of Mathematics for outstanding performance in mathematical competitions.

The Henry Schuman Music Prize. A prize of \$350 is awarded annually to an undergraduate of Duke University for an original composition or a distinguished paper in music history or analysis. The award is sponsored by the Department of Music through a continuing gift from Dr. and Mrs. James H. Semans, who named the prize after Henry Schuman, a lifelong friend of the Semans and Trent families, a talented amateur violinist, and one who helped to build valued collections in the Duke library.

Giorgio Ciompi Scholarships. These music scholarships are given to students who can demonstrate talent and achievement on a string instrument. Although recipients need not major in music, they are required to study privately. These scholarships are at least \$500 and are renewable annually for up to four years as long as the student exhibits good performance and makes significant progress.

The Smith Memorial Scholarship. This scholarship of up to \$2,000, in memory of Marvin Boren and Elvira Lowe Smith, is awarded to an organist who is an undergraduate music major or a graduate student in performance practice. It is renewable as long as the recipient continues to study the organ and maintains satisfactory progress.

Keyboard Classics Magazine Scholarship. This music scholarship of up to \$1,000 is awarded on the basis of merit to an entering pianist. It is renewable annually as long as the recipient is registered for applied piano study and is making satisfactory progress.

Sheet Music Magazine Scholarships. Two music scholarships of \$750 each are offered annually to entering first-year instrumentalists on a competitive basis. Enrollment in applied music (in the principal instrument) and participation in a departmental ensemble are required. The awards are renewable for up to four years as long as these requirements are met and progress is satisfactory.

The Julia Wilkinson Mueller Prize for Excellence in Music. An award of \$300 will be presented to a graduating senior for achievement in musical performance.

Robert S. Rankin Political Science Awards

Award in American Government and Constitutional Law. An award to the outstanding student in the field of American government and constitutional law. A prize of at least \$150 is donated by a former student of Professor Rankin's, Judge Jerry B. Stone, A.B. '44, J.D. '48.

Award in American National, State, and Local Governments. An award to the outstanding student in the field of American national and/or state and/or local governments. A prize of at least \$100 is also donated by Judge Stone.

American Government Award for Leadership and Academic Achievement. One or more awards have been donated by Robert H. Connery, Professor Emeritus of Public Law and Government at Columbia University, and from 1949-65 a colleague of Professor Rankin's when both were members of the Duke faculty, and by a group of Professor Rankin's former students. These awards are given to students, chosen by the Department of Political Science, who have demonstrated excellence in the study of American government and whose past achievements and future promise manifests not only high intellectual attainments, but also an exemplary leadership role in service to Duke University or to the community as broadly defined.

Alona E. Evans Prize in International Law. An annual award to an undergraduate and/or graduate student in arts and sciences whose paper(s) on international law reflect(s) excellence in scholarship. Substantial money prizes are derived from income earned on the generous bequest of Professor Alona E. Evans, A.B. '40, Ph.D. (political science) '45.

Elizabeth G. Verville Award. An annual award to the undergraduate who submits the best paper in the subject matter of political science. Funds for the award of \$100 are derived from a gift by Elizabeth G. Verville, a political science major, A.B. '61.

The Marguerite (Mimi) Voorhees Kraemer Award. This annual award was created by the family and friends of Mimi Voorhees, a public policy studies major, class of 1979. It recognizes a PPS student who has demonstrated strong leadership qualities and a commitment to public service. This award is given to a junior as a scholarship to help defray the costs of participating in the summer internship program.

The Joel Fleishman Distinguished Scholar Award. This award is presented annually by the Sanford Institute of Public Policy, recognizing the graduating major with the highest academic achievement in public policy.

The Terry Sanford Departmental Award. This award is presented annually by the Sanford Institute of Public Policy to the graduating major recognizing his/her achievement in leadership.

The Karl E. Zener Award for Outstanding Performance of a Major in Psychology. The Karl E. Zener Award is given to a psychology major who has shown outstanding performance and scholarship. The award, based on the student's total grade record and a paper submitted to the award committee, consists of a monetary prize and inclusion by name on a memorial plaque in Zener Auditorium.

Chester P. Middleworth Awards. These awards were established to encourage and recognize excellence in research and writing by Duke students in their use of primary source materials held by the Special Collections Library. Two cash awards are made annually to undergraduates through the Special Collections Library, which is housed within Perkins Library.

The Richard L. Predmore Award in Spanish. Given each year to an outstanding Spanish major in honor of Richard L. Predmore, professor of Spanish at Duke University from 1950-1978 and dean of the Graduate School from 1962-1969.

The William Senhauser Prize. Given by the mother of William Senhauser in memory of her son, a member of the Class of 1942, who gave his life in the Pacific theater of war on August 4, 1944. This award is made annually to the student in Trinity College of Arts and Sciences or the School of Engineering who has made the greatest contribution to the University through participation and leadership in intramural sports. The winner of this prize is chosen by a committee appointed by the president of the university.

Kevin Deford Gorter Memorial Endowment Fund. This fund was created by the family of Kevin Deford Gorter to assist, promote, and expand the Sport Clubs program at Duke University. An award is made annually to the student who has made the greatest contribution to the program and best exemplifies the purposes of Sport Clubs at Duke University.

****The William M. Blackburn Scholarship.*** This fund was established in 1962 to honor William Blackburn, distinguished teacher of writing at Duke. The scholarship, awarded by the Department of English, recognizes outstanding achievement in the field of creative writing.

The Anne Flexner Memorial Award for Creative Writing. This award was established by the family and friends of Anne Flexner, who graduated from Duke in 1945. Open to all Duke undergraduates, the competition for prose fiction (5,000-word limit) and poetry (200-line limit) is sponsored in the spring semester by the Department of English. Entries are judged by the department's Committee on Creative Writing; awards range from \$200 to \$500.

The Rudolph William Rosati Fund. Established in 1978 by Mr. W. M. Upchurch, Jr., this fund honors the memory of his friend, the late Mr. Rosati, a talented writer. Awards are given to encourage, advance, and reward creative writing among undergraduate students. A committee named by the provost oversees the program and distribution of the fund.

***The Margaret Rose Knight Sanford Scholarship.** This fund was established in recognition of the untiring efforts of Margaret Rose Knight Sanford on behalf of Duke University. The scholarship is awarded to a female student who demonstrates particular promise in creative writing. Awards are made by the Department of English.

***The Francis Pemberton Scholarship.** This award was created by the trustees of the Mary Duke Biddle Foundation in memory and in honor of Francis Pemberton's service to the Biddle Foundation. The scholarship is awarded by the Department of English to a junior or senior pursuing the study of creative writing.

***The E. Blake Byrne Scholarship.** This fund was created in 1986 by E. Blake Byrne (Trinity College, Class of 1957). The award is made by the Department of English to rising juniors with demonstrated talent in creative writing.

The Raymond D. Lublin, M.D. Premedical Award. This award to an outstanding graduating senior who will be attending medical school and who has excelled in both science and non-science areas of the curriculum was established in the name of an honored physician and surgeon by his wife, Mrs. Raymond D. Lublin.

The Walter J. Seeley Scholastic Award. This award is presented annually by the Engineers' Student Government to that member of the graduating class of the school who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor the spirit of academic excellence and professional diligence demonstrated by the late Dean Emeritus Walter J. Seeley. It is hoped that this award will serve as a symbol of the man and the ideals for which he stood. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The American Society of Civil Engineers Prize. The prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding civil engineering seniors, upon recommendation of the faculty of the civil engineering department. The basis for selection is the student's scholastic record, contribution to the student chapter, and participation in other college activities and organizations. The prize consists of a certificate of award and the payment of one year's dues in the American Society of Civil Engineers.

The George Sherrerd III Memorial Award in Electrical Engineering. This award is presented annually to the senior in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and has rendered significant service to the School of Engineering and the university at large. The award was established in 1958 by the parents of George Sherrerd III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. Recipients receive a monetary award, and their names are inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award. This award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke branch of the Institute of Electrical and Electronics Engineers or significant contributions to electrical engineering. The award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmow Prize. This prize is awarded annually to students from North or South Carolina graduating in the Department of Electrical Engineering, who, in the opinion of the faculty of that department, and, as shown by their grades, have made the most progress in electrical engineering during the last year in school. The prize consists of a certificate of award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded the baccalaureate degree.

The Raymond C. Gaugler Award in Materials Science and Engineering. This award is presented annually to the senior who has made the most progress at Duke in developing competence in materials

science or materials engineering. The basis for selection is the student's scholastic record, research, or design projects completed at Duke, and interest in a materials-related career. The award has been established by Patricia S. Pearsall in memory of her grandfather, Raymond C. Gaugler, who was president of the American Cyanamid Company prior to his death in 1952.

The American Society of Mechanical Engineers Award. This award is presented annually to a senior in mechanical engineering for outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The award consists of a certificate of recognition.

The School of Engineering Student Service Award. This award, established in 1978, is given to those graduating seniors who, by their contributions of time, effort, and spirit, have significantly benefited the community of the School of Engineering. The names of the recipients are inscribed on a plaque displayed in the Engineering Building.

The T.C. Heyward Scholarship Award. This award is presented annually to an outstanding senior in mechanical engineering at Duke University. The recipient is chosen by a committee of the mechanical engineering faculty and selection is based on academic excellence, engineering ability, and leadership. The recipient receives a monetary award and his or her name is inscribed on a plaque displayed in the Engineering Building.

The William Brewster Snow Award in Environmental Engineering. This award is presented to an outstanding senior in civil engineering who, through superior academic achievement and extracurricular activities, has demonstrated interest and commitment to environmental engineering as a career. Selection of the recipient is made by the civil engineering faculty. The recipient is presented with an inscribed plaque and his or her name is also inscribed on a plaque permanently displayed in the Engineering Building.

The Otto Meier, Jr. Tau Beta Pi Award. This award was established in recognition of Dr. Meier's leadership in establishing the North Carolina Gamma Chapter in 1948 and his continuous service as chapter advisor until 1975. This award is given annually to the graduating Tau Beta Pi member who symbolizes best the distinguished scholarship and exemplary character required for membership. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The da Vinci Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior with the most outstanding academic record. This award commemorates the contributions of Leonardo da Vinci in laying the foundations for the study of biomechanics.

The von Helmholtz Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior who has made the most outstanding contribution to the department. This award commemorates the work of von Helmholtz in laying the foundations of biomedical engineering.

Aubrey E. Palmer Award. This award, established in 1980, is presented annually by the faculty of the Department of Civil and Environmental Engineering to a civil engineering senior in recognition of outstanding academic achievement. The award consists of a certificate of recognition and the name of the recipient inscribed on a plaque displayed in the Engineering Building.

The Mechanical Engineering and Materials Science Faculty Award. This award is presented annually in recognition of academic excellence to the graduating mechanical engineering senior who has attained the highest level of scholastic achievement in all subjects. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

Education Records

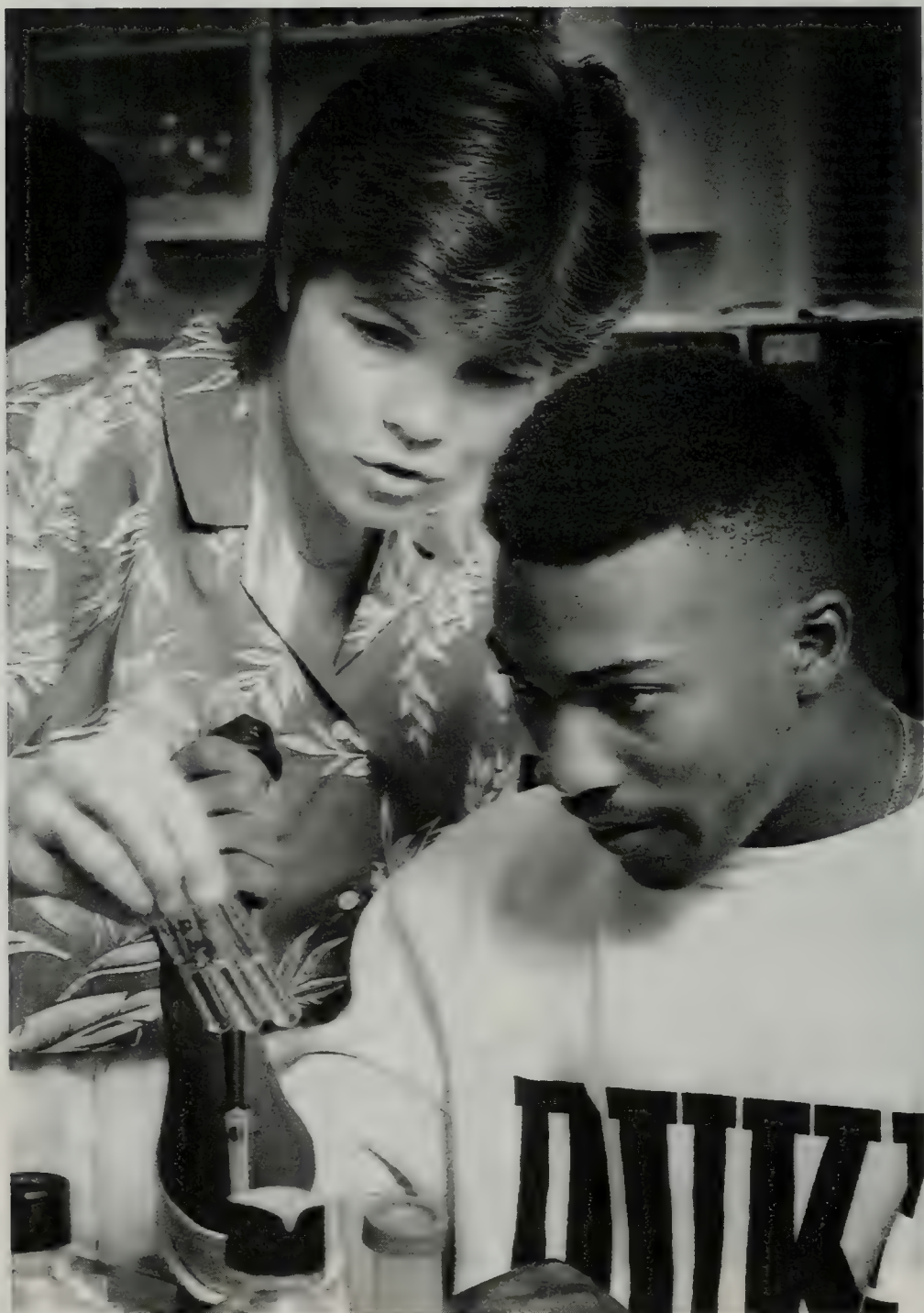
Duke University adheres to a policy permitting students access to their education records and certain confidential financial information. Students may request review of any information which is contained in their education records and may, using appropriate procedures, challenge the content of these records. An explanation of the complete policy on education records may be obtained from the registrar's office.

No information, except directory information (see below), contained in any student records is released to persons outside the university or to unauthorized persons on the campus, without the written consent of the student. It is the responsibility of the student to provide the Office of the Registrar and other university offices, as appropriate, with the necessary specific authorization and consent.

Directory information includes name, addresses, e-mail addresses, telephone listing, photograph, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and most recent previous educational institution attended. This information may be released to appear in public documents and may otherwise be disclosed without student consent unless a written request not to release this information is filed in the Office of the Registrar by the end of the first week of classes each term.



Special Study Centers, Programs, and Opportunities



Campus Centers and Institutes

INTERNATIONAL AND AREA STUDIES PROGRAMS

Center for International Studies. The university's Center for International Studies promotes, coordinates, and supports a wide array of research and teaching activities on international issues in Arts and Sciences and the professional schools. Faculty associated with the center come from diverse disciplines and reflect a wide range of intellectual interests. Their primary bond is a concern with peoples, events, movements, and institutions outside the United States; relations among nations; and activities and institutions in the United States that affect the rest of the world. The center fosters the belief that comparative knowledge and understanding of other cultures and societies are essential for an appreciation of the world in which we live and deserve primary emphasis in teaching and research in the university.

The functions of the center are to provide focus, structure, and support to the research efforts of associated scholars and to serve as a catalyst for the coordination of varied research undertakings. It also assists in dissemination of these undertakings and fosters international activities in educational, research, and governmental institutions in the local area and in the southeastern United States.

The Center for International Studies is involved in monitoring and initiating change in the international curricula of the undergraduate, graduate, and professional schools of the university. It has a special interest in undergraduate education and, through a variety of programs and activities, makes a contribution to the undergraduate academic experience. It seeks to attract students to the wide range of international and comparative courses available, and it offers awards to rising sophomores for summer travel and research overseas. In recognition of the excellence of its programs, Duke's Center for International Studies has been designated a National Resource Undergraduate Center in International Studies by the U.S. Department of Education.

In addition, the center provides funding for graduate student and faculty travel and research, and for interdisciplinary faculty working groups and committees which sponsor programs such as visiting speakers, faculty seminars, conferences/symposia,

film series, working papers and other activities. Thematic and area studies committees include:

- African Studies
- Asian-Pacific Cultural Transformations
- Comparative Islamic Studies
- Comparative Labor Studies
- Democratic Institutions in East Asia
- Gender in International Perspective
- National Identity, Nationalism, and Ethnicity
- South Asian Studies
- Transitional Issues in the Former Soviet Union

Asian/Pacific Studies Institute. This program, administered by the Asian/Pacific Studies Institute, supports and encourages Asian and Pacific studies with special emphasis on Japan and China. Courses offered cover a range of disciplines including Japanese, Chinese, Korean, anthropology, economics, art, history, political science, music, and religion. The institute provides support for visiting lecturers and conferences and makes available a limited number of fellowships annually. Study abroad opportunities are available in China and Japan. An East Asia concentration is possible for majors in comparative area studies.

Canadian Studies Center. The Canadian Studies Center administers the Canadian Studies Program, which offers courses introducing students to various aspects of Canadian life and culture. Courses and lectures in a wide range of disciplines in the humanities and the social sciences are designed to increase students' knowledge and understanding of Canada. Special emphasis is placed on Canadian problems and comparisons of Canadian and American perspectives. Concentrations in Canadian studies are described in the chapter "Courses of Instruction." Study abroad opportunities are available.

Latin American Studies Program. The Council on Latin American Studies administers a comprehensive program in Latin American studies. A wide range of courses in the humanities, the social sciences, Portuguese, and Spanish is offered. Visiting professors and lecturers from Latin America, a speakers series, conferences, and summer programs abroad are supported by the program. Faculty associated with the program work closely with students majoring in comparative area studies who concentrate in Latin America.

In addition, the council and the Institute of Latin American Studies at Chapel Hill sponsor the Duke-University of North Carolina Program in Latin American Studies that includes yearly faculty exchanges of two faculty members from each institution, pre-dissertation awards for travel in Latin America, joint undergraduate and graduate student seminars, graduate student colloquia, and faculty-student research working groups.

Center for Slavic, Eurasian, and East European Studies. With the support of the U.S. Department of Education, this joint Duke-University of North Carolina Center coordinates interdisciplinary efforts primarily in the fields of Russian (including Soviet) and East European history, economics, political science, literature, linguistics and language training. Language instruction in Russian, Polish, and Ukrainian is available. The committee also sponsors visiting lectures, conferences, symposia, and films.

Center for European Studies. Faculty associated with the Duke-University of North Carolina Center for European Studies promote comparative research, graduate training, and teaching activities concerned with historical and contemporary European issues. Funded in part by the U.S. Department of Education, this program regularly sponsors campus-wide events, such as conferences on contemporary trends in European politics and society and recent developments in the European Union. It also supports faculty-

student working groups, curriculum development, and library materials acquisition. A West Europe concentration is available for Comparative Area Studies majors.

CENTER FOR RESEARCH ON WOMEN (Duke-UNC Chapel Hill)

The Duke-UNC Center for Research on Women was founded in 1982 as a collaborative endeavor between Duke University and the University of North Carolina (Chapel Hill) to promote women's studies scholarship and research; to support curriculum development in women's studies; and to disseminate women's studies research and information throughout the South. The center principally seeks to explore the dynamics of gender, race, and class, with a particular emphasis on the American South.

Its regular activities include a working paper series, a biannual newsletter, publications, and the sponsorship of conferences, colloquia, and community events. Students seeking information should inquire at 338 Carr Building (Duke), (919) 684-6641 or at 03 Caldwell Hall 009A (University of North Carolina, Chapel Hill), (919) 966-5787.

CENTER FOR DOCUMENTARY STUDIES

This interdisciplinary center for research, teaching, and the dissemination of documentary studies is dedicated to encouraging and supporting the work of photographers, filmmakers, historians, journalists, novelists, and others who work by direct observation and participation in the lives of individuals and communities. A variety of center sponsored projects offer a limited number of assistantships to graduate students in the arts and humanities.

The center also offers courses under the auspices of several Duke departments including history, public policy studies, education, and English. Such courses, often special topics courses, have included American Communities: A Documentary Approach; Advanced Documentary Photography; The Segregated South; and Into the Fields: Migrant and Seasonal Farmworkers in North Carolina.

For more information consult Iris Tillman Hill, Director, Center for Documentary Studies, Lyndhurst House, 1317 West Pettigrew Street, Box 90802, Durham, North Carolina 27708-0802.

CONTINUING EDUCATION

Academic Study. Local adult residents are encouraged to pursue academic study at Duke (1) as potential degree candidates, for those who have not been full-time college students for at least four years and are now resuming or beginning a bachelor's degree; (2) as nondegree students, for those with baccalaureates who now seek a sequence of undergraduate credit courses; and (3) as students completing the last year of work towards a degree at another institution. These students are given academic counseling by the Office of Continuing Education and University Summer Programs and are subject to most of the regulations set forth for degree candidates. Continuing education applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office, accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

Career Development Services. Career Development Services assists persons making decisions about returning to work, re-entering school, career planning and assessment, life/work transitions, and individual goal setting. Individual appointments, group sessions, and workshops are held.

Short Courses and Conferences. Short courses (noncredit) in the liberal arts are offered regularly throughout the year for those interested in personal enrichment or career advancement. Conferences, institutes, and training programs are conducted during the academic year and in the summer. Some are residential and others are designed for local participants. Some award continuing education units.

The Institute for Learning in Retirement. The institute is for persons over fifty years of age who recognize in themselves a need to continue learning and sharing knowledge.

Duke Institute for English Language and U.S. Culture. This intensive summer institute is designed to help international students strengthen their English skills.

For brochures on each program and for fuller information, write or call the Office of Continuing Education and University Summer Programs, The Bishop's House, East Campus, (919) 684-6259.

INSTITUTE OF THE ARTS

The Institute of the Arts is a center for the interdisciplinary presentation, support, production, and study of the arts. The institute coordinates artist residencies on campus and in the community, presents series in contemporary performance, world music/dance, and modern dance. Working with a representative faculty council, the institute coordinates and supports new curricular initiatives in the arts and works to develop cooperative programs between Duke and the surrounding community. An undergraduate certificate program in the arts is offered as well as a one-semester, off-campus residency program, Duke in New York Arts. The institute is also the administrative home for the Duke Dance Program. It provides support for student and faculty projects in the arts and administers awards and prizes. For further information, inquiries should be made to Duke University Institute of the Arts, 109 Bivins Building, Box 90685, (919) 684-6654.

INSTITUTE OF STATISTICS AND DECISION SCIENCES

The Institute of Statistics and Decision Sciences was founded in 1985 to conduct and coordinate teaching and research in statistics and the application of quantitative methods to the study of decision making. The institute offers a wide range of course work and consultation in mathematical statistics, statistical modeling, applied statistics, statistical computing, decision analysis, and utility theory. Students interested in the activities of the institute should consult the institute office, 214 Old Chemistry Building, (919) 684-4210.

Specialized Programs Within Academic Units

Through the programs described below, students have the opportunity to engage in the specialized study of an area without the concentration required of a major. These programs, supplements to the basic course of study, usually reach beyond departmental boundaries and generally provide an interdisciplinary focus to the subject matter. If completed, many offer official recognition of participation, often in the form of a certificate. More information may be obtained from the directors of the programs.

AFRICAN AND AFRO-AMERICAN STUDIES

The Program in African and Afro-American Studies offers a certificate program to students desiring a focused study of the experience of peoples of African ancestry in a variety of contexts, including, but not limited to, Africa and the Americas. Students interested in more detailed study may choose to do a major in the field. Additional information about the certificate program is given in the chapter "Courses of Instruction" in this bulletin.

ASIAN AND AFRICAN LANGUAGES AND LITERATURE

Established in 1988, the Program in Asian and African Languages and Literature (AALL) offers courses in the languages, literatures, and cultures of more than two thirds of the world's population. These languages include Arabic, Chinese, Hebrew, Hindi,

Japanese, Korean, Persian, and Swahili. To qualify for the certificate in AALL, students must take two years of introductory and intermediate language instruction, a core course, and four other courses taken from AALL listings. Full details concerning the program and its courses can be obtained by writing or calling the director, Professor Jing Wang, Asian and African Languages and Literature, 2101 Campus Drive, 919-684-4309.

DANCE

The Dance Program offers its students the opportunity to study modern dance, ballet, dance history, choreography, repertory, and non-Western dance forms in an environment that challenges the student's intellectual, expressive, and physical capabilities. A balanced integration between the creative/performance and the historical/theoretical aspects of dance is emphasized. Academic courses in dance provide a historical and theoretical foundation for the student's creative work. In turn, the student's participation in dance creation and performance, and the development of technical skill, deepen the student's scholarly appreciation of the medium. With this approach the aim of the program is to develop students who are sensitive physical communicators of the visual art of dance and who are articulate spokespeople for the art form.

The program offers courses in technique, performance, and theory. A certificate is available to students who meet the requirements for it, as described in the "Courses of Instruction" section of this bulletin. Students are urged to enroll in at least one summer session with the American Dance Festival. If appropriate to the student's specific course of study, one course credit earned at the American Dance Festival may be counted toward the certificate requirements. Through the Duke in New York Arts Program, a student has the opportunity in the fall semester of the junior or senior year to pursue the study of dance in New York City; appropriate courses taken at New York University may fulfill certificate requirements.

EARLY CHILDHOOD EDUCATION STUDIES

This program provides opportunities to plan an individualized certificate program combining an orientation to the field of early childhood studies (birth to kindergarten), a selection of courses in two areas of knowledge (the development of the child and the conditions of childhood), and a supervised internship in selected early childhood centers. Admission to the program and advising of students are determined by a committee of professors from the departments of psychology, sociology, cultural anthropology, and education. For more information and a program brochure, inquire at the Program in Education (660-3075).

FILM AND VIDEO

The Program in Film and Video introduces students to the critical analysis of new communications technologies: film, photography, and television. Practical experience in 16mm film and videotape production is also available through course work and internships. Established in 1986, this program also sponsors speakers, film and video screenings, and exhibits under the rubric of Screen/Society. For further information, students should consult the program director, Professor Jane Gaines, 107A Art Museum, (919) 684-4130.

THE FOCUS PROGRAMS

FOCUS offers first-year students a number of programs in the fall semester, each featuring a cluster of courses with a common theme. Classes are small, interrelated, and mutually reinforcing, providing opportunities for discussion and multiple perspectives. Since one of the aims of FOCUS is to encourage the integration of academic life

with residential life, participants live in the same residence halls together with non-FOCUS students.

Each of the following FOCUS programs requires participants to take 3.5 courses, including two seminars, University Writing Course 7, and a half-credit Interdisciplinary Course (IDC). The interdisciplinary course is designed to provide a social setting for the discussion of ideas related to the theme of the program as a whole or of topics of special interest intended to supplement the content of the seminars. It meets once a week over dinner.

Further information and application forms may be obtained from the Pre-Major Advising Center.

The Arts in Contemporary America. The FOCUS program on the Arts in Contemporary America offers students the opportunity to explore the place of art, music, dance, creative writing, and drama in our society. The seminars offered will give an overview both of various art forms and of the problems facing artists and the arts at the end of the twentieth century. The emphasis this year will be on the performing arts.

Contemporary Global Cultures. The Contemporary Global Cultures program offers students the opportunity to explore social, economic, political, and ethical issues related to African, Asian, and Latin American cultures. It will examine the relationship of the Third World to the West, globalization, economic and cultural interdependency, as well as power and identity in the new global order.

Evolution and Humankind. Students of Evolution and Humankind will study the evolution of human beings and the diversity and similarity of human experience. Evolutionary thinking has radically changed our perceptions of ourselves and the world around us. The Evolution and Humankind program investigates the ethical and social dimensions of scientific inquiry with topics ranging from human nature to the social implications of modern genetics and biotechnology and from the religion/evolution controversy to modern epidemics.

Exploring the Mind. The program Exploring the Mind is designed to introduce students to the study of the mind: what it is, what it produces, and how it works. It will address such questions as the relation between mind and brain, the connection between language, thought, and social interaction, how culture and the brain have co-evolved, and how brain mechanisms contribute to our understanding of human experience. The program will consider how the mind/brain works to produce thought, emotion, consciousness, culture, and language.

Medieval and Renaissance Studies. The Medieval and Renaissance Studies program will explore how communities are made and the means by which they are brought together symbolically, and it will do so in the context of the profound economic and social changes that transformed Western Europe over the twelfth, thirteenth, and fourteenth centuries. The program will examine the processes of "imagining community" from the perspectives of literature, the visual arts, and history.

Popular Culture and Mass Media. The program in Popular Culture and Mass Media is concerned with the way in which popular culture transmits values and ideas to the world's citizenry and the role of the mass media in this process of transmission. Professors of cultural anthropology, literature, drama, and other disciplines collaborate in this program to create a challenging forum for exploring the tensions between personal and local visions and the force of the mass media in shaping the meaning of culture, communication, and representation in social life.

Science, Technology, and Modern Culture. Students in Science, Technology, and Modern Culture explore important developments in twentieth-century sciences, their historical significance, and their sociocultural impact. Faculty from the sciences, engi-

neering, mathematics, history, and sociology participate, leading an investigation of the complex and dynamic relationship between science/technology and the social and political institutions that constrain and promote it.

Structure in Nature and Human Designs. The Structure in Nature and Human Designs program investigates a wide variety of natural and social phenomena in terms of their distinct "structures." By recognizing and describing the organizational systems of molecules, bodies, vehicles, cities, and ideologies, it is possible to understand them more fully. Since the structures to be traced are not simply objective or natural but often the result of our own cultural conditioning, this study leads to greater self-knowledge as well as a fuller understanding of the world around us.

Twentieth-Century America. The Twentieth-Century America Program considers the challenges facing America in the last decade of the twentieth century from the perspectives of history, literature, religion, political science, art, and sociology. Social change, democracy and political ideals, and ethics are examined within the context of history and contemporary society.

Twentieth-Century Europe. The Twentieth-Century Europe program is designed to introduce students to major themes of European history and culture in the twentieth century. Nationalism, modernism, socialism, and total war will be an important focus of the program. Participants will also examine the forces at work that led to the establishment of the present-day European Community. Since language is a fundamental form of cultural expression, students are expected to enroll either in the program seminar offered in French or in another course in a European language.

HEALTH POLICY

Through its Center for Health Policy Research and Education, the university offers undergraduates a sequence of health policy courses whose successful completion will lead to a certificate. The certificate sequence in health policy culminates in an integrative group project. For further information, inquire at the Center for Health Policy Research and Education, Suite 125 Old Chemistry Building.

HUMAN DEVELOPMENT

This interdisciplinary program provides opportunities to compare and to explore the complementarity of disciplinary perspectives on the biological, biomedical, psychological, social, and cultural aspects of human development. The program, which is more fully described under "Courses of Instruction," integrates courses, a research apprenticeship, and special events through an active advisory procedure. For more information and a program brochure, consult Professor Robert J. Thompson, Jr., (919) 684-5072.

INTERDISCIPLINARY GERMAN STUDIES

The Interdisciplinary German Studies Program unites offerings from art and art history, Germanic languages and literature, history, music, philosophy, political science, religion, Slavic languages and literatures, and sociology. It offers a perspective on the world in so far as it has been shaped by individuals and societies who use the German language. Students in the program may earn a certificate by taking a prescribed group of courses outlined in the chapter "Courses of Instruction."

Students may also pursue this program in Germany while participating in a Duke-approved study abroad program during a summer or during their junior year. Duke offers its own summer program at the Friedrich Alexander University in Erlangen/Nürnberg and a spring and fall semester program at the Free University of Berlin. For further information consult the Director of the Program in Interdisciplinary

German Studies, Department of Germanic Languages and Literature, 116H Old Chemistry Building, (919) 660-3161.

JUDAIC STUDIES

Duke University through the auspices of the Center for Judaic Studies offers a full range of courses in Judaic civilization. Participating departments and programs include religion, Germanic languages, Asian and African languages, comparative literature, history, political science, international studies, anthropology, and women's studies. Also, courses may be taken at nearby Chapel Hill where additional courses are offered in Judaic Studies. A full range of courses is available in classical and modern Hebrew as well as in Yiddish. Students desirous of further language training or specialization may elect to pursue their studies in Israel during their junior year at a Duke approved program.

The program in Judaic studies is largely focused on undergraduates who may earn a certificate in Judaic studies after taking any four nonlanguage courses, or who may pursue Judaic studies under Program II, the alternative program option. This option offers a student the flexibility to design, with the aid of a faculty advisor, a curriculum to accommodate unusual interests and talents. Some students may also choose to concentrate on Judaic studies within the context of a religion major; such students are also eligible to receive a certificate.

Duke regularly sponsors its own summer program in Israel and over 800 students have participated in it to date. For further information, inquire at the Center for Judaic Studies, Box 90964, Duke Station, Duke University, Durham, North Carolina 27708-0964.

MARKETS AND MANAGEMENT STUDIES

The Program in Markets and Management Studies is designed to meet the needs of undergraduates who wish to combine a liberal arts education with preparation for careers in business management, advertising, public relations, and retailing. Students choose from a wide range of courses in a number of departments in seeking to understand how business enterprises operate and how markets for goods, services, and labor are changing in an increasingly competitive global economy. Core courses, offered by the Department of Sociology, place a heavy emphasis on case studies of actual management and marketing problems and are intended to teach a broad range of analytical and practical skills.

A certificate is awarded on completion of the requirements for the program. Participants in the program are offered the chance to use film and video materials for extraclassroom discussion, have the use of a resource room, and can compete for research funds. The program also seeks to facilitate business internships for qualified students. For further information consult Professors Kenneth Spinner or John Wilson in the Department of Sociology.

NEUROSCIENCES

The Neurosciences Program reflects the rapid developments in our understanding of brain mechanisms and behavior. Undergraduates are offered opportunities to learn about these developments in new and existing courses. The approach to the neurosciences is broad, covering the cellular and subcellular levels (molecular and genetic properties, cell and membrane physiology, neurochemistry), systemic levels (neuroanatomy, sensory and reflex function, brain disorders), and integrative levels (perception, memory, behavioral genetics, evolution of brain and behavior). The program emphasizes breadth in the arts, sciences and humanities, with an understanding of the neurosciences as an integral part of a liberal education. Students interested in the neurosciences should request information from the co-directors, Professors W. G. Hall (psychology) and Stephen Nowicki (zoology).

PERSPECTIVES ON MARXISM AND SOCIETY

Perspectives on Marxism and Society is a program devoted to the study of Marxist theories of society. Courses in the program focus on Marxism, not primarily as a political or ideological system, but as a scholarly methodology incorporating a variety of analytical techniques across a wide range of disciplines. The unifying theme of the program is a critical appraisal of Marxist methods of analysis and their social implications, considered in the light of theoretical alternatives and changing historical circumstances. Courses included in the program cover a wide range of subjects, including sexual and racial inequality, alienation, development and underdevelopment in the world system, labor processes, protest movements, and ideologies.

Students in the program will be required to take a core course in varieties of Marxist analysis. Four additional approved courses, no more than three from one department, will complete the program of study. A certificate will be awarded to those who meet the requirements of the program. Students in the program will be expected to major in another discipline, with the program a supplement to their major. Full details concerning the program and its courses can be obtained by writing or calling the director, Professor Fredric R. Jameson, Graduate Program in Literature and Duke Center for Critical Theory, 104 Art Museum, (919) 684-4127.

PRIMATOLOGY

The Primatology Program provides an interdisciplinary investigation of primate development and evolution from the anatomical, ecological, and behavioral perspectives. Theoretical issues arising from sociobiology and new fossil discoveries will be tested as to their validity when applied to human evolution. The course of study leads from a generalized introduction through more specialized topics to the design and completion of a research project at the Duke University Primate Center or in a faculty laboratory under the guidance of a faculty member. The final step is an oral presentation of the research results in a senior seminar. For more information on the Primatology Program call the Department of Biological Anthropology and Anatomy at the Wheeler Building, (919) 490-6286.

SCIENCE, TECHNOLOGY, AND HUMAN VALUES

The Program in Science, Technology, and Human Values provides students an opportunity to explore the social and cultural dimensions of science, technology, and medicine. Through course work and a wide variety of extracurricular activities, students are introduced to the perspectives and insights of other disciplines in order to develop a richer and more informed understanding of their own field of specialization. The program brings together students and faculty from the sciences and engineering with their counterparts in the humanities and social sciences, with a heavy emphasis on interdisciplinary study and discussion. Detailed information is given in the chapter "Courses of Instruction" in the bulletin.

WOMEN'S STUDIES

Women's Studies is an interdisciplinary program devoted to the study of women, gender, and feminist theories. It aims to promote scholarship within all disciplines on the lives and voices of women; constructions of gender and sexualities; and the interrelationships between gender and the multiple conditions within which it operates, such as race, ethnicity, class, and history. Women's Studies has several roles: to transform scholarship in the traditional disciplines by integrating the study, contributions, and voices of women; to create a new body of interdisciplinary study and feminist theory; and to promote social change to improve the lives of women and men, girls, and boys.

The Women's Studies program at Duke University began in 1982, building on courses incorporating gender issues that had been offered since the '60s and now making

an explicit gender focus possible. Women's Studies offers courses with the Women's Studies (WST) designation and cross-listed courses in other academic programs and departments taught by affiliated faculty, and co-curricular activities such as lecture series, dinner seminars, reading groups, and an annual research conference. Undergraduate students may pursue either a major or a certificate in Women's Studies, the requirements for which are discussed in the "Courses of Instruction" section of the bulletin.

The Women's Studies program at Duke is the first in the country to have formed a national Council on Women's Studies. The council, made up of alumnae, parents, administrators, and friends of Women's Studies, works toward the development of resources, greater visibility for the program, and networking. As a service, Women's Studies offers faculty, student, and peer advising. It exchanges information about courses, internships, fellowships, and job opportunities through such channels as mailings and informal gatherings sponsored by the program. For more information on Women's Studies, inquire at the program office at 210 East Duke Building, (919) 684-5683.

RESERVE OFFICER TRAINING CORPS

Duke University and the military services cooperate in offering officer education programs to provide opportunities for students to earn a commission in the United States Air Force, Army, Navy, or Marine Corps. The programs are described below, and detailed information on scholarships, entrance requirements, and commissioning requirements is available from the offices of the Department of Air Force Aerospace Studies, the Department of Military Science (Army), and the Department of Naval Science. Courses offered in these departments are described in the chapter "Courses of Instruction" in this bulletin.

The Air Force Reserve Officer Training Corps (AFROTC). AFROTC selects, trains, and commissions college men and women as officers in the U.S. Air Force. AFROTC offers a four-year and a two-year curriculum leading to a commission as a second lieutenant. The four-year program consists of both the General Military Course (GMC), a course sequence taken during the freshman and sophomore years, and the Professional Officer Course (POC) taken during the junior and senior years. Entry into the POC is competitive and requires successful completion of a field-training encampment during the summer between the sophomore and junior years.

The GMC is open to freshmen and sophomores. Students who complete both the freshman and sophomore years of the program and successfully compete for entry into the POC will attend a four-week training encampment. All other successful POC applicants will attend a six-week encampment. Students interested in the two-year POC program should submit applications no later than early spring semester of their sophomore year. Between the junior and senior years, POC cadets are given the opportunity to volunteer for advanced training in a variety of different areas.

Cadets may compete for two- and three-year scholarships. These scholarships pay up to full tuition, books, and a monthly tax-free stipend of \$100. All members of the POC receive the nontaxable stipend. Upon graduation all cadets are assigned to active duty with the U.S. Air Force for a period of at least four years. Direct inquiries to the Department of Aerospace Studies, 303 North Building, (919) 684-3641.

The Army Reserve Officers' Training Corps (AROTC). Army ROTC provides students with an opportunity to earn a commission as a second lieutenant in the U.S. Army, U.S. Army Reserve, or Army National Guard while completing requirements for a baccalaureate degree. Two programs are available, a four-year and a two-year program.

The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). Direct entry into the Ad-

vanced Course (two-year program) is possible under specific circumstances. Students wishing to join the two-year program must confer with the Department of Military Science not later than April 1 of their sophomore year. There is only one mandatory summer training requirement, Advanced Camp, which takes place over a six-week period between the junior and senior years. All uniforms and some texts are provided.

Upon commissioning, the service obligation may be fulfilled on active duty, in the Army Reserve, or in the Army National Guard, as directed by the Secretary of the Army. At the beginning of the senior year, cadets submit a preference statement concerning the method by which they wish to fulfill their service obligation and the specialty in which they desire to serve. A request to delay the fulfillment of the service obligation in order to attend graduate or professional schooling is also authorized.

Cadets are encouraged to compete for Army ROTC scholarships which pay up to \$12,000 towards tuition, fees, a generous textbook and equipment allowance, and \$150 per month for each month in school (up to \$1,500 per year). Nonscholarship Advanced Course cadets also receive the \$150 monthly stipend. All of the above benefits are tax-free. Participants in Advanced Camp are paid one-half of the basic pay of a second lieutenant.

Detailed information is available from the Department of Military Science, 06 West Duke Building, East Campus, Box 90752, (919) 660-3091 or 660-3090, or 1-800-222-9184.

The Naval Reserve Officer Training Corps (NROTC). The Department of Naval Science offers students the opportunity to become Naval and Marine Corps officers upon graduation. Selected students may receive up to four years of tuition, fees, uniforms, and textbooks at government expense under the auspices of the Scholarship Program. In addition, scholarship students receive subsistence pay and summer active duty pay of approximately \$1,300 a year. They participate in four weeks of summer training either aboard ship or at naval shore facilities to augment their academic studies. Four years of active duty service as a regular officer is required upon graduation.

Nonscholarship students may be enrolled in the College Program. They take the same courses and wear the same uniform, but attend the university at their own expense. Uniforms and naval science textbooks are provided by the government. During the last two academic years, they are enlisted in the Naval Reserve, receive \$100 per month subsistence pay, and participate in summer training. Three years active duty service as a reserve officer is required upon graduation.

College Program students may compete for scholarship status through academic performance, demonstrated aptitude for military service, and nomination by the Professor of Naval Science. Students in either program may qualify for a commission in the Marine Corps through the Marine Corps Option Program. Students seeking further information on the NROTC program may call the Department of Naval Science, 225 North Building, (919) 660-3700.

Off Campus Opportunities

STUDY ABROAD (Office of Foreign Academic Programs)

A Duke student may earn credit for approved work completed during the academic year at a foreign university or for an approved program abroad sponsored by Duke or by another approved American college or university in the fall, spring, and summer. To receive the maximum amount of study abroad transfer credit at Duke—generally four course credits for a full semester, eight for a full academic year, two for a summer—a student is expected to take a full, normal course load, as defined by the other institution involved. The responsible Duke departments, however, make the final decision on the final number of credits transferable. Students attending British universities for the full academic year can transfer a maximum of eight courses. However, at British universities which are on the trimester system, only three course credits may be transferred for the

single fall semester. Students attending such universities in the spring are generally required to attend the two remaining trimesters and may transfer a maximum of five credits. No additional study abroad transfer credit will be awarded for a course overload. A leave of absence from the university is granted for a semester or academic year of approved study abroad. Duke-administered programs do not involve transfer credit and do not require a leave of absence. Arrangements are made normally for students to register, while abroad, for the term in which they plan to return. Seniors planning to spend their last semester abroad are subject to the residence requirement and may face postponed graduation because transcripts from abroad are often delayed. Students studying abroad on programs not administered by Duke will be charged a study abroad fee. See page 95 for information concerning fees for studying abroad on non-Duke programs.

Semester and Academic Year Programs

A student who wishes to receive transfer credit for study abroad should take into account the following criteria established by the faculty and administered by the Committee on Study Abroad:

1. a scholastic average of at least a B- (a student lacking this average may petition the academic dean responsible for study abroad if there are unusual circumstances);
2. certification, when applicable, from the foreign language department concerned, that the student has an adequate knowledge of the language of the country in which study is pursued;
3. approval, obtained before leaving Duke, of the appropriate directors of undergraduate studies for the courses to be taken abroad, as well as approval of the program and the courses by the dean responsible for study abroad and by the student's academic dean;
4. permission for leave of absence once program plans are complete.

Duke, at present, offers various programs in cooperation with other universities during the fall and spring terms. Students accepted may study in:

Australia. Duke has agreements with a number of top Australian universities, allowing students to become members of outstanding teaching and research institutions in Australia for a semester or an academic year. The universities currently available are the University of Sydney, the University of Melbourne, the University of New South Wales, the University of Western Australia, the University of Queensland, James Cook University, and the University of Tasmania. Applications are available in 121 Allen Building.

Austria. From time to time Duke sponsors a term program in Vienna for members of the Wind Symphony.

Britain. Duke has agreements with a number of top British universities, allowing our students to become members of outstanding teaching and research institutions in Britain for a semester or academic year. The universities currently available are the University of London (King's College, Imperial College of Science, Technology and Medicine, the London School of Economics and Political Science, Queen Mary and Westfield College, and University College); the University of Birmingham; the University of Bristol; the University of Edinburgh; the University of Manchester; the University of Sussex; and the University of Warwick. There is a special program for engineers at University College London. Applications are available in 121 Allen Building.

Canada, Montreal. Duke students participating in the Duke/McGill University Exchange Program may spend one semester or academic year at McGill, located in the Quebec city of Montreal. Because the language of instruction at McGill is English, program applicants need not have studied French although some knowledge of it would

be advantageous. The program is sponsored by the Canadian Studies Center and Trinity College; information and application forms are available in 121 Allen Building.

China. In cooperation with Nanjing University and Beijing Teachers College, Duke conducts a six-month study program in the People's Republic of China in the summer and fall terms. The program includes a fall term at Nanjing University preceded by an intensive language session in Beijing. Participants must have at least one year of Chinese language. Information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, and in 121 Allen Building.

Egypt, Cairo. Through an agreement with the American University in Cairo, Duke students may spend a spring semester or academic year there taking regular classes with Egyptian students. They may enroll in general courses in humanities, social sciences, and sciences, as well as in Arabic language and specialized courses in Middle Eastern studies. Applications are available in 121 Allen Building.

England, Bristol. (Planned for spring 1996.) An intensive study of dramatic literature and drama in performance based at the Department of Drama, Film and Television at the University of Bristol, with three weeks in London. Students will take a full course load at Bristol, including a special Bristol/London course designed for the program. Information will be available from 121 Allen Building and from Professor John Clum, English Department, 203B Allen Building.

England, Oxford. Through a special arrangement with two colleges at the University of Oxford, selected Duke students may spend their junior year at Oxford as regularly enrolled visiting students. The students are treated exactly like their British counterparts, and most of them live in college housing. Students may choose to concentrate their study in any one of the major fields in the humanities, social sciences, or selected natural sciences. Each student is assigned a tutor. Applicants must have a very strong academic record; previous course work in the subject to be pursued at Oxford is also required. Admission to this program is at the discretion of the University of Oxford. More information may be obtained in 121 Allen Building.

France, Paris. Duke offers a full-year program in Paris in conjunction with the University of Paris-I, IV, and VII. The language of instruction will be French; one course will be offered by the resident director, and three courses will be taught by the Parisian faculty. Applicants must have completed four semesters of French plus two courses at the 100-level or above with a grade of at least B+. Priority will be given to juniors and full-year applicants, although some participants may be admitted for one semester only. More information may be obtained in 121 Allen Building or the Department of Romance Studies, 205 Languages Building.

Germany, Berlin. Duke students study at the Humboldt University of former East Berlin (fall) and at the Free University of former West Berlin (spring). Each semester they take specially arranged courses in German language and literature and the social sciences for Duke credit, and they audit a course of their choosing at the German university. One year (fall or year program) or two years (spring program) of college-level German or its equivalent are required. More complete information may be obtained in 121 Allen Building.

Italy, Rome. As one of the participating members of the Intercollegiate Center for Classical Studies in Rome, Duke University may send classics majors and other students with strong classical interests for admission to a term's work at the center, usually in the junior year. Instruction is offered in Greek, Latin, ancient history, ancient art, and archaeology. Some scholarship help is available. Additional information may be obtained from the Department of Classical Studies, 236 Allen Building.

Japan, Tokyo. Qualified students may be recommended each year by the Asian-Pacific Studies Committee for the junior year exchange program with International Christian University in Tokyo. This small, select university is noted for the international character of its student body (85-90 percent Japanese, 10-15 percent non-Japanese, primarily from other Asian nations and the United States). Courses may be taken in

English as well as Japanese. More information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, or 121 Allen Building.

Scotland, Glasgow. The Department of Public Policy Studies offers departmental majors the opportunity to study during the fall semester of their senior year at the University of Glasgow where, practically speaking, public policy analysis was invented. Students will live on campus and will take the program's special seminar in public policy in addition to three electives from the general university curriculum. Further information may be obtained from the director of undergraduate studies in the Department of Public Policy Studies, Sanford Institute of Public Policy.

Spain, Madrid. This program offers advanced students a variety of on-site experiences and an opportunity to hear and speak Spanish in an ideal environment. The program offers courses in Spanish history, culture, literature, politics, and arts, as well as several organized excursions. Students are housed with selected Spanish families. More information may be obtained in the Department of Romance Studies, 205 Languages Building, or in 121 Allen Building.

A number of additional approved programs sponsored by other institutions are also available to Duke students for study abroad. Further information concerning semester and academic year programs, as well as summer programs, may be obtained in 121 Allen Building. All Trinity College students are responsible for following the procedures and meeting the deadlines set forth in materials available in 121 Allen Building. In all cases, the dean of study abroad must be informed in advance about a student's plans.

Duke Summer Programs Abroad

The Office of Foreign Academic Programs, in cooperation with several university departments, provides many opportunities for students to study abroad during the summer while earning Duke University credit. Information about Duke Summer Programs Abroad and about the time they will next be offered can be obtained from the program directors or the Office of Foreign Academic Programs, 121 Allen Building.

Australia, Sydney. This two-course, six-week program will focus on Australian environmental studies and will be based in Sydney at the University of New South Wales. One course, to be taught by a professor at the University of New South Wales, will deal with Australian studies. The second course will focus on environmental/ecological issues and will be taught by Professor Richard Searles of Duke University, who will also direct the program. Students will be housed in accommodations at the University of New South Wales. For further information consult the Office of Foreign Academic Programs, 121 Allen Building.

Belgium/Netherlands. This two-course, six-week program will focus on a contextual study of Late Medieval, Renaissance, and Baroque art and culture in Belgium and the Netherlands. The courses are: Art 158-159: Art and Cultural History of Flanders and the Netherlands from the Fifteenth through the Seventeenth Centuries (AL) (cross-listed with Comparative Area Studies) taught in English by Professor Hans van Miegroet of Duke, Dutch and Flemish guest lecturers, and art specialists. The program is based for the first two weeks in Amsterdam (Netherlands) and for the remaining four weeks in Gent (Belgium). Participants visit numerous Dutch and Belgian cities and museums. Accommodations are in hotels. For further information consult Professor Hans van Miegroet, Department of Art and Art History, 112 East Duke Building or the Office of Foreign Academic Programs, 121 Allen Building.

Canada. This two-course, six-week program provides a complete immersion in French. This is a Duke-approved rather than a Duke-administered program; students receive transfer credit for work successfully completed. Students are placed in one of nine levels of language instruction during the program. Upon return they are tested and then placed in the appropriate Duke level if they intend to continue with French language studies at Duke. Instruction and accommodations are by the University of Quebec, Trois Rivières campus. For further information consult Patrice LeClerc, Cana-

dian Studies Program, 2016 Campus Drive or the Office of Foreign Academic Programs, 121 Allen Building.

France, Paris and Avignon. This two-course, six-week program provides the opportunity to take Duke courses in the ambience of Paris. French 137: Aspects of Contemporary French Culture (CZ, FL) (cross-listed with Comparative Area Studies), is a conversation course taught by a native French speaker; the second course is offered by the Duke director. Four semesters of college French or equivalent are required. Students live in dormitory-style accommodations. For further information consult the Office of Foreign Academic Programs, 121 Allen Building.

Germany, Erlangen. (German Language and Culture Program.) Duke offers two programs at the Friedrich-Alexander Universität at Nürnberg. One program (mid-May to the end of June) provides an opportunity to study classroom German at different levels while living with a German family and participating in study, day trips, and excursions. The courses are German 150: Composition (FL); German 153: Aspects of Contemporary German Culture (CZ, FL) (cross-listed with Comparative Area Studies). Two semesters of college German or the equivalent are required. In the other program (early May to the end of July), advanced students may choose from a variety of FAU courses all taught in German and remain for a full summer semester (through early August). Semester program students live in dormitories. For further information consult Professor Helga Bessent, Department of Germanic Languages and Literature, 107 Languages Building or the Office of Foreign Academic Programs, 121 Allen Building.

Greece. A four-week, one-course program in Greece focusing on the cultures of ancient Greece. The course, Classical Studies 157/ Art 115: Ancient Greece (CZ), is taught by Professor John Younger of Duke University who will also be the program director. The course concentrates on Athens and southern Greece and consists of on-site lectures at numerous sites of historical and archaeological interest throughout the area. Travel will be provided in Greece by private coach. Accommodations will be in hotels. For further information consult Professor Younger, Department of Classical Studies, 228 Allen Building or the Office of Foreign Academic Programs, 121 Allen Building.

India, Bombay. This two-course, six-week program focuses on the emergence of modern Indian society and media. The courses are History 100E: Indian History and the Present (CZ), taught by a professor from the University of New Delhi, and Asian and African Languages and Literature 138: The Media in Modern India (CZ), taught by Professor Satti Khanna of Duke. (Both courses are cross-listed with Comparative Area Studies.) The program will be based in Bombay. Accommodations are in a hotel. For further information consult Professor Satti Khanna, Asian and African Languages and Literature, 2101 Campus Drive or the Office of Foreign Academic Programs, 121 Allen Building.

Israel, Galilee. This two course, six-week program gives students an opportunity to participate in an archaeological dig. The program is designed to introduce students to the discipline of field archaeology and to the religious, social, and cultural history of ancient Palestine from the Greek period to the Islamic period. The field excavations are located in Galilee at ancient Sepphoris, the administrative capital of that region in the first century C.E. Students register for Religion 99/ Cultural Anthropology 99/ Classical Studies 99/ Interdisciplinary Course 99: Perspectives in Archaeology (CZ), taught by Professor Carol Meyers of Duke and Religion 110: Archaeology and Art of the Biblical World taught by Professor Eric Meyers of Duke. All courses are taught in English. For further information consult Professor Carol or Eric Meyers, Department of Religion, 118 Gray Building or the Office of Foreign Academic Programs, 121 Allen Building.

Italy, Florence. This two-course, six-week program will focus on Renaissance Florentine history and art. Courses will be taught in English under the direction of a Duke University professor. Students live in a hotel. For further information consult the Office of Foreign Academic Programs, 121 Allen Building.

Italy, Rome. This one-course, three and one-half week program in Rome explores the history and culture of Rome and includes visits to historical sites and museums, walking lectures, and readings. The course Classical Studies 145/ Art 126: Rome: History of the City examines the history of the city from the earliest times through the Baroque and modern periods. The course is taught in English. Students will have accommodations in dormitories. For further information consult the Office of Foreign Academic Programs, 121 Allen Building.

Japan. This two-course, six-week program at Hosei University near Tokyo focusing on Japanese culture and Japanese business management. One course is taught by Duke faculty, the other by faculty of Hosei University. Both courses are taught in English. Students live variously in a hotel, dormitories, and with families. For further information inquire at the Office of Foreign Academic Programs, 121 Allen Building.

Morocco. This two-course, six-week program offers the opportunity to study North African religion and Moroccan culture at the Cadi Ayyad University of Marrakesh. Courses are taught in English. Field trips are part of the courses. Accommodations are in hotels. For further information consult Professor Vincent Cornell, Department of Religion, 115 Gray Building or the Office of Foreign Academic Programs.

Russian Republic. This program offers two Russian language and culture courses in St. Petersburg. Russian language study at different levels will be offered. Classes in St. Petersburg will be taught at the University of St. Petersburg by faculty members of the university. Prerequisite: a minimum of two semesters of college-level Russian is suggested. Students will be housed in an apartment-hotel. For further information consult Professor Edna Andrews, Department of Slavic Languages, 314 Languages Building or the Office of Foreign Academic Programs, 121 Allen Building.

Spain. This two-course, six-week program in Malaga and Madrid offers advanced Spanish students further language training as well as the opportunity to study Spanish culture, history, and politics. Participants can choose two of the following courses: Spanish 131: Spain, Yesterday and Today (CZ, FL); Spanish 137: Art and Civilization (CZ, FL); Spanish 141S: Literature and the Performing Arts (AL, FL); and Political Science 100M.01: Government and Politics of Spain (SS). There will also be excursions to Barcelona, Salamanca, Toledo, Segovia, Granada, Sevilla, and Cordoba. All courses are conducted in Spanish, and students live with Spanish families. For further information consult Professor Miguel Garci-Gómez, Department of Romance Studies, 205 Languages Building or the Office of Foreign Academic Programs, 121 Allen Building.

Turkey, Istanbul. This two-course, six-week program at the Technical University of Istanbul focuses on structure and on Byzantine and Ottoman architecture. One course, taught by Professor Utku of the Duke University School of Engineering, will focus on architectural structures; the other, taught by a professor from the Technical University, will focus on art and architecture. Accommodations will be at the university. Excursions to architectural sites are a part of the program. For further information contact Professor Utku, Engineering School, 052 Engineering Building, or 121 Allen Building.

United Kingdom, Cambridge. A two-course, six-week program directed by Professor Peter Fish of Duke University will focus on the contributions of English law to American constitutionalism and law as well as on the historical and contemporary political and legal system of Britain. The courses are Political Science 100K.01: Anglo-American Constitutionalism, Law and Legal Institutions, taught by Professor Peter Fish, and Political Science 100K.02: British Government and Constitutional Law, taught by a faculty member from Britain. Accommodations will be at a college of Cambridge University. Excursions will be made to the English courts at London, Ely, and Norwich, and to the Scottish courts at Edinburgh. For further information consult Professor Peter Fish, 503 Perkins Library, Department of Political Science or the Office of Foreign Academic Programs, 121 Allen Building.

United Kingdom, London-Drama. This two-course, six-week program offers the opportunity to study drama using the resources of London's theaters in conjunction with

study of dramatic texts. The courses are Drama 148S/English 176S: Text and Performance (AL) and Drama 149S/English 134S: Drama in Performance (AL). Both courses are taught jointly by Professor John Clum of Duke and a distinguished group of British theater practitioners from London and Bristol. The group will attend many theater productions in London and at Stratford-upon-Avon. Accommodations are in a dormitory of the University College, London. For further information consult Professor John Clum, 304B Allen Building or the Office of Foreign Academic Programs, 121 Allen Building.

United Kingdom, Oxford. This six-week session at New College, Oxford, utilizes the Oxford tutorial system of education supplemented by lectures given at the University of Oxford's International Graduate Summer School by noted British scholars. Areas of study include British Literature 1760-1830, Twentieth-Century British Literature, Modern British History, Politics and Government in Britain since 1945, and Law: Personal Injuries in United Kingdom and the United States. For further information consult Professor Thomas Robisheaux, 305 Carr Building or the Office of Foreign Academic Programs, 121 Allen Building.

Vietnam, Hanoi. This six-week program offers a double credit course on Cultural Studies in Vietnam. It will focus on the art, literature, music, philosophy and social history of Vietnam. The course will be taught by Professor Kristine Stiles of the Department of Art and Art History with professors from Hanoi University who will guest-lecture on a wide variety of topics in Vietnamese cultural studies. With Professor Stiles, students will arrive in Ho Chi Minh City and travel by bus to Hanoi. In Hanoi, students will take classes, meet with Vietnamese families, attend cultural and intellectual events, and have access to noncredit instruction in Vietnamese language. For further information contact Kristine Stiles, 111A East Duke Building, Department of Art and Art History, or 121 Allen Building.

DUKE UNIVERSITY MARINE LABORATORY (School of the Environment)

The Duke University Marine Laboratory (DUML) is located within the Outer Banks, adjacent to the historic seacoast town of Beaufort, North Carolina, with direct access to the Atlantic Ocean, Cape Lookout National Seashore Park, sand beaches and dunes, estuaries, wetlands, and maritime forests. Because of the dynamic collisions of offshore currents, the area provides an excellent opportunity for marine study. A component of the School of the Environment, the Duke University Marine Laboratory is an interschool teaching and research facility dedicated to the study of coastal and oceanic processes and human disturbances of those processes. The Beaufort campus of Duke has available dormitory and dining facilities, classroom laboratories, research buildings, a specialized marine science library, as well as a variety of boats which are utilized in both teaching and research activities. A year-round seminar series which includes both guest lecturers and the resident academic and research staff additionally serves to enrich the student community.

At the undergraduate level, the Marine Laboratory serves students in the natural and environmental sciences as well as those in the social sciences, humanities, or engineering who have adequate preparation. Academic programs include a fall semester and spring semester for undergraduate juniors and seniors, summer courses designed for both undergraduate and graduate students, and a cooperative program for students from several colleges and universities. The academic programs integrate classroom lectures and laboratories with direct field and shipboard experiences. For additional information and application materials, write to the Admissions Office, Duke University, School of the Environment, Marine Laboratory, Beaufort, North Carolina 28516-9721.

AGREEMENTS WITH OTHER UNIVERSITIES

Neighboring Universities. Under a plan of cooperation, the interinstitutional agreement among Duke University and the University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and North Carolina Central University in Durham, a student regularly enrolled in Duke University and paying full fees may enroll for one approved course each semester at one of the institutions in the cooperative program. One interinstitutional course per summer may be taken at a neighboring institution participating in this agreement provided that the student is concurrently enrolled at Duke for one full course credit. This agreement does not apply to contract programs such as the American Dance Festival.

Approval forms for courses to be taken at these neighboring institutions may be obtained from the offices of the academic deans at Duke. Ordinarily, only those courses not offered at Duke will be approved. Credit so earned is not defined as transfer credit since grades in courses taken under the interinstitutional agreement are entered on the official record and used in determining the quality point ratio. The student pays any special fees required of students at the host institution and provides transportation.

Howard University. Duke students participating in the Duke/Howard University Exchange Program may spend a semester studying at Howard University in Washington, DC, while Howard undergraduates enroll for the same period at Duke. More information about this program, administered by Trinity College, is available in 121 Allen Building.

Special Summer Programs

DUKE SUMMER FESTIVAL OF CREATIVE ARTS

The Duke Summer Festival of Creative Arts is administered jointly by the Summer Session Office and the Office of Cultural Affairs. The festival provides an exciting, artistically stimulating environment for the campus and community. The Ciompi Quartet, Duke's well-known chamber music ensemble, will perform. Other special events such as jazz concerts, carillon recitals, dance and theater performances, and film series are planned.

The American Dance Festival. The six-week program offers a wide variety of classes, performances, and workshops. For a catalog, write to the American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

PRECOLLEGE PROGRAM

During the summer of 1995, Duke University will offer a Term II program for academically talented rising high school seniors from across the country. The PreCollege Program is designed to provide the academic challenge of college-level courses to qualified college-bound students and to help prepare them for the adjustments they will be making when they enter college. Students will enroll in two regular summer session classes with Duke undergraduates. Introductory level courses in the humanities, social sciences, and natural sciences will be offered for college credit. The students will live in supervised, air-conditioned university dormitories, eat their meals in the university dining halls, enjoy the opportunity of studying with distinguished members of the Duke faculty, and will have access to all university libraries and athletic facilities. In addition to the classroom experience, PreCollege students participate in a range of programs and activities designed to aid them in college selection, career exploration, and intellectual and social development. For further information consult the PreCollege Program, Duke University, Box 90747, Durham, North Carolina 27708-0747, (919) 684-3847.



Campus Life and Activities



Student Affairs

The mission of Student Affairs is to create opportunities and challenges for students to broaden their intellectual, spiritual, and emotional horizons—and, in so doing, to engage them with the widest range of persons both within the university and beyond in striving towards a community which reflects the highest aspirations of all its members.

The Division of Student Affairs complements the educational mission of the university by helping to relate many of the nonacademic components of the university to the academic experiences of the students. The residence halls, the athletic fields, the Chapel, and many student organizations play an important humanistic and holistic role in the students' university experience by developing leadership qualities, skills in interpersonal relationships, and appreciation for the care of the physical self. Thus, the university experience encompasses collectively the life of the mind, body, emotions, and, indeed, the spirit.

Residential Life

Duke has a long tradition as a residential university and has sought to provide convenient housing for the majority of the undergraduate students. While the university was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

Although first-year students are required to live in the university residence halls, a number of upperclass students choose to live off campus. Students enrolled beyond their fourth year of the undergraduate program cannot be granted space in university housing. Part-time students and former students who have been readmitted are not eligible for on-campus housing.

Residence Halls and Apartments. The university accommodates approximately 91 percent of its undergraduates in sixty-six residence hall living groups located on East, West, and North Campuses and in apartments located on Central Campus. Within one of the residence halls, there are language corridors for students interested in speaking French, Spanish, German, and Russian. Other residence halls house the Arts Theme House for students interested in, but not necessarily majoring in, the arts; the Women's Studies House; and students interested in community service.

University housing is considered to include residence hall space as well as Central Campus Apartments. Placement in any of these areas fulfills the university's obligation to house eligible students in university housing. Free on-campus bus service connecting East, West, North, and Central Campuses is provided by the university.

First-year students live together in residence halls clustered primarily on East Campus; upperclass students reside not only in all-upperclass residence halls but also in Central Campus Apartments. Residential fraternities are housed in sections of upper-class residence halls; by tradition, sororities are not residential. Housing assignments for first-year students are made by lottery to residence halls while upperclass housing assignments are made by a combination of lottery and student choice. Within the residence halls, students live in single, double, or triple rooms. Living groups elect officers and organize social, intramural, educational and cultural programs, as well as community service projects.

All of the residence halls have resident advisors who live in the houses and are members of the staff of the Office of Student Development. These graduate and undergraduate students have broad responsibilities in the residential life of the university, including counseling students with personal problems, advising the house governments, and serving as resource persons for students.

Residence Hall Programming. Educational and cultural programming is planned and presented throughout the year in the residence halls through the cooperative work of the Office of Student Development, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are a number of faculty members in residence in both first-year student and upperclass houses. Faculty offices and seminar rooms are also located in several of the first-year student houses. The goals of these various residential programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside the formal classroom, and to develop a greater sense of community within the individual residence halls as well as within the greater university.

Living Off Campus. The option of living off campus is available for students after the first semester of their first year, and those who choose this option may retain their resident status and eligibility for university housing if they follow the proper procedures as published by the Office of Student Development.

Dining Facilities

All students living in campus residence halls are required to participate in a dining plan. Several dining plans are available, all of which allow a student to make purchases in a wide variety of dining locations by accessing a prepaid account carried on the student identification card, or DukeCard (see 'Food and Other Expenses' in the chapter "Financial Information"). Duke Dining Services provides cafeterias, restaurants, fast food operations, delis, snack bars, ice cream/dessert shops, and catering services.

Dining service operations are located on each campus. Facilities on East Campus include the East Food Court (a collection of food shops including Li'L Dino subs, a grill, international food station, salad bar/healthy food shop, pasta area, deli, pizza station, and a dessert/ice cream shop), the East Union Cafeteria, Upper East Side (snack bar), and the Magnolia Room (restaurant). On West Campus, students may use their dining plan in the Blue & White Room (cafeteria), the University Room (cafeteria), the Oak Room (restaurant), the Cambridge Inn (featuring the Weigh Station food bar, breakfast bar, deli, hot subs, pastry, and desserts), the Rathskeller Sports Bar (hamburgers, pasta, and sandwiches), Burger King (fast foods), and Licks (ice cream/frozen yogurt). North and Central Campus locations include Trent Drive Cafe and The Pub on Central Campus (specialty sandwiches, salads, and beverages).

University Catering accepts dining plan funds from individual students or student groups and will provide food and/or catering services for cookouts, study breaks, banquets, parties, or any other campus event. Students may also use the funds in their dining plan to purchase food items in three campus convenience stores: Uncle Harry's General Store on Central Campus, The East Campus Store on East Campus, and the

Lobby Shop on West Campus. Dining plan funds may also be used to order pizza and sub sandwiches delivered to campus from participating area businesses.

Religious Life

Two symbols indicate the importance of religion to this university since its founding: *Eruditio et Religio*, the motto on the seal of the university, and the location of the Duke Chapel at the center of the campus. People from all segments of the university and the community gather in Duke Chapel on Sunday morning to worship in a service which offers excellent liturgy, music, and preaching. The world's outstanding Christian preachers have preached from the Duke Chapel pulpit.

The dean of the Chapel and the director of Religious Life work with the campus ministers and staff from the Roman Catholic, Jewish, and Protestant communities, and with other groups to provide a ministry which is responsive to the plurality of religious interests on the campus.

Through the religious life of the university, students are encouraged to search for meaning, to ask the ultimate questions, to worship, to meditate in the beautiful chapel, to learn from outstanding theologians from a wide array of traditions, and to work to bring about a more just and humane society.

Services Available

The Office of Student Development. This office works with the Duke student body in a variety of ways and is concerned with creating a residential community supportive of a solid educational experience. It advises individual students regarding personal problems, houses undergraduates in the residence halls, and assists students to plan and present educational and cultural programs within the residence halls.

One hundred twenty-eight resident advisors (RAs), staff members of the Office of Student Development, reside in the residence halls and are directly responsible for the administration of the student residences and their programs. They also are available for counseling students and/or referring them to the various personnel services which provide specialized advice or counsel.

First-year student advisory counselors (FACs), who are upperclass men and women selected for qualities of responsibility and leadership, work through the Office of Student Development. Members of the FAC program are assigned to a small group of first-year students and, during orientation, welcome their groups and help to acquaint them with the university.

Judicial affairs are handled through the office by coordinating and applying the general rules and regulations of the university as well as working with all participants involved in the judicial process and coordinating the student advising system.

The Office of Student Development also works with transfer students, advises student residential living groups, and oversees the university's response protocol to student emergencies.

The Student Health Service. The Student Health Service, which provides medical care, advice, and education for all currently enrolled full-time students and part-time degree candidates, is administered by the Department of Community and Family Medicine, Duke University Medical Center.

The primary location for medical care is the Duke Family Medicine Center (Marshall Pickens Building) where students are seen, by appointment, for assessment and/or treatment. When a student's health needs warrant additional specialized treatment, the Duke Family Medicine Center serves as a portal of entry to other health resources within the Duke medical community. The infirmary, another Student Health facility, provides inpatient treatment of illnesses too severe to manage in residence halls or apartments, but not requiring hospitalization. If necessary, Duke Public Safety provides on-campus

transportation to the health care facilities. A Student Physical Therapy Clinic in Card Gym is also available for treatment of sports-related injuries.

The health education component of Student Health is headquartered on the first floor of Trent Drive Hall. There is also a satellite office, called the Healthy Devil Health Education Center, on West Campus. A full-time health education staff is available to assist students in making informed decisions that lead to healthy lifestyles at Duke and beyond. Topics of concern and interest include alcohol and other drug usage, eating and nutrition, sexual activity, and stress management. Programs, meetings, and consultations are provided for groups and individuals.

A list of students in the infirmary or hospital is routinely provided to the academic deans, who issue excuses to students when appropriate. However, information regarding the physical or mental health of Duke students is confidential, released only with the student's permission. This policy applies regardless of whether the information is requested by university officials, friends, family members, or health professionals not involved in the student's immediate care.

All currently enrolled full-time students and part-time degree candidates are assessed a Student Health Fee for each enrolled semester. This covers most of the services rendered within the Student Health Service. An optional Summer Health Fee for students who are not enrolled in summer sessions is also available through the bursar's office.

In addition to the Student Health Service, the university makes available a plan of accident and sickness insurance to protect against the high cost of unexpected illnesses or injuries which are not covered by the Student Health Fee and would require hospitalization, surgery, or the services of specialists. This insurance covers students both on and off campus, at home, or while between home and school during interim vacation periods throughout the one-year term of the policy. All full-time students and part-time degree candidates are required to enroll in this insurance policy unless they show evidence that they are covered by other generally comparable insurance. This waiver statement, contained in the remittance form of the university invoice, requires that the name of the insurance company and policy number be indicated as well as the signature of the student or parent. International students, as well, are required to show proof of health insurance coverage (either the policy offered by Duke or comparable coverage) and may not assume responsibility for personal payment of health care cost.

Upon arrival on campus, all students receive a detailed brochure about the Student Health Service and the services covered by the Student Health Fee. Additional copies of the brochure are available at the Duke Family Medicine Center and at the Office of Student Development.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) provides a comprehensive range of counseling and developmental services to assist and promote the personal growth of Duke students. The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide evaluation and brief counseling/psychotherapy regarding a wide range of concerns, including such issues as self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. While students' visits with counselors are usually by appointment, emergencies are handled when they arise.

Each semester, CAPS offers a series of counseling groups and seminars focusing on enhancement of self-understanding and coping strategies. Support groups have been offered for second generation Americans; African American students; students with bulimia; and gay, lesbian, and bisexual students. Seminars have addressed such topics as stress management, social skills development, and dissertation problems.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admission tests. The staff is also available to the entire university community for consultation regarding student development and

mental health issues affecting not only individual students but the campus community as a whole. They work with campus personnel, including administrators, faculty, student health staff, religious life staff, resident advisors, and student groups, in meeting needs identified through such liaisons. Staff members are also available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If a student desires that information be released to anyone, written authorization must be given by the student for such release. Evaluation and brief counseling/therapy as well as skills development seminars are covered by the student health fee. There are no additional costs for these services.

For additional information, see the *Bulletin of Duke University: Information and Regulations*, or call (919) 660-1000.

Sexual Assault Support Services. Located in the Women's Center, the Office of Sexual Assault Support Services offers advocacy, support, and twenty-four hour crisis intervention services to victims of rape and sexual assault. The S.A.S.S. coordinator trains groups such as the resident advisors and DARE (Duke Acquaintance Rape Education) and initiates ongoing educational programs to alert students to problems of sexual assault and interpersonal violence.

Career Development Center. The mission of the Career Development Center is to educate the students of Duke University in the arts of self-assessment, career exploration, career planning, and job hunting with the goal of helping them develop rewarding and fulfilling careers. The center primarily serves the students and alumni of Trinity College, the School of Engineering, and the Graduate School.

Career counselors are on staff helping students early in their lives at Duke to begin the process of discovering career interest. Career specialists then help students focus on specific career fields, including the arts, business, community service, education, engineering, mathematics, computer science and the physical sciences, government, health and life sciences, international careers, and mass media. Career specialists also work closely with the faculty and the deans of Trinity College in directing students interest towards effective application to graduate and professional schools.

Programs and services of the center include the Ventures Internship Program offering semester-long internships in local area businesses, the Health Careers Internship Program offering experiences at the Medical Center and elsewhere in Durham, the Service Learning Project offering stipends for summer work in community service, the On-Campus Recruiting Program offering interviews for summer and permanent positions with a wide variety of national organizations, and the Credential Service which collects and sends letters of recommendation.

The Career Spectrum, a career newsletter, is designed to keep students constantly aware of career-related opportunities on and off-campus. Announcements of job openings, career seminars, workshops, and information sessions are announced each week. The Career Library and J.O.B. Room provide a wealth of printed and database materials on specific career fields and specific employers. CareerNet, a new online information system, provides information at computer clusters located throughout the university and is available 24 hours a day. By using CareerNet, a student may review bulletins, information about the center, review summer and full-time job listings, and register to participate in center programs.

Offices for Program Planning

The Office of University Life. The Office of University Life helps enhance the climate of the campus through the programming efforts of such organizations as the University Union, the Mary Lou Williams Center for Black Culture, the Duke Artists Series, Broadway at Duke, Duke Debate, the Craft Center and through advising student

clubs and organizations. The Bryan Center Information Desk is also under the auspices of this office.

The Office of University Life is responsible for the creation, coordination, and implementation of many of the cultural and popular entertainments which take place on campus. The office is directly responsible for the Duke Artists Series and the Chamber Arts Society Series; it also schedules the use of Page Auditorium and directs the use of this hall. For the Summer Session Office, this office directs the Duke University Summer Festival of the Arts and works with the Institute of the Arts. In addition to these arts-related activities, the Duke University Yearly Calendar is published and distributed from this office. All campus events should be recorded by the calendar office as early as possible in order to avoid conflicts. The office, through the Event Advising Center, also serves in an advisory capacity to student groups sponsoring and registering major events.

The Office of University Life also serves as a resource for student organizations, student leaders, the Duke University community and the community-at-large, in a manner which fosters an environment of trust and exploration of new experiences. As such, the staff members serve as educators and direct service providers, developing a community that strives toward excellence. To these ends, the office promotes the development of leadership skills through a variety of programs which both educate and support individual students and student organizations, while recognizing and saluting their efforts; is the central resource for information concerning student organizations, acting both as a liaison and an advocate; facilitates the financial management of organizational funds, both providing counsel and direct services.

The Mary Lou Williams Center for Black Culture is also part of the Office of University Life. The center was dedicated in memory of the "great lady of jazz" and former artist-in-residence whose name it bears. Since its beginning, the center has established its significance as the gathering place on campus where broadly-based issues of social/cultural relevance are addressed to an increasingly larger cross-section of the Duke Community. The center's audience includes greater numbers of students who are prepared to honor the wonder of African-American history and culture. Such is addressed each year in many programs and events celebrating black possibilities and black successes. Among past programs have been art exhibits by renowned African-American artists, musical events, film series, film seminars, and a number of lecture-discussions of relevant topics. In addition, the center has expanded its programs from the particularly black to include Asian, Hispanic, Native American and Indian students, all of whom evoke new possibilities for multicultural appreciation. In the past several years, the center has been used increasingly by faculty, student, and employee groups for meetings, receptions, lunches, seminars, and programs.

Another responsibility of the Office of University Life is advising the Duke University Union which was founded in 1955 "to promote social, cultural, intellectual, and recreational interaction among all members of the university community in such a way as to complement the educational aims of the university." Operating under a board consisting of undergraduate and graduate students, faculty, administrators, and university employees, the union's programming committees present a range of programs including touring professional theater, rock, pop, jazz and classical music concerts, film screenings, art exhibits, major speakers, crafts fairs and more constituting over 200 performances and presentations each year. In addition the union operates the on-campus television station (Cable 13), FM radio station (WXDU), a film production program and produces and markets the world's first annual college video yearbook. The union also operates craft centers on east campus and west campus and coordinates planning and operating policies of the Bryan Center. Union programming committees are open to any member of the Duke community.

The Women's Center. The Women's Center, an office serving both women and men, is the locus for advocacy, programming, and information/referral for students on

gender issues. Working in cooperation with other university units such as the Women's Studies Program, Counseling and Psychological Services, and Student Health education, the mission of the center is to promote a safe, healthy, and mutually empowering climate for female and male students, both inside and outside the classroom.

The center offers research support and participates in university policy-making processes that concern gender and campus climate issues. The center provides support and direct advocacy for students who have gender-related concerns. There are an on-site art gallery, library, and resource file. In conjunction with the permanent staff, student staff develop and lead programming. Specific foci are women of color, lesbian and bisexual women, sorority women, safety, mentoring, and health.

The Women's Center serves as advisor to diverse student organizations, including sororities, Men Acting for Change, Duke Acquaintance Rape Education, and politically-oriented groups. The Women's Center also includes the office of Duke Sexual Assault Support Services.

International House. International House is the center of cocurricular programs for almost eight hundred students at Duke from seventy-nine countries, as well as for U.S. American students who have lived abroad, are interested in other cultures, are considering study abroad (see the section on study abroad in the chapter "Special Programs"), or are planning to travel outside the United States. The International Association, sponsored by International House and composed of both U.S. American and foreign students, plans social and cultural programs which emphasize personal contact and informal exchange of ideas among students from diverse backgrounds. Included are weekly open houses with lectures, discussions, films, potluck dinners or parties; and periodic trips outside of Durham.

Programs of International House which assist students from abroad in participating in the life of the Duke and Durham communities include an intensive orientation program at the beginning of the academic year; the International Friends Program, in which interested international students may become acquainted with U.S. American families or individuals; Duke Partners, in which an international student is paired with a U.S. American partner for weekly meetings to work on language and life skills; Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community; and English conversation classes which meet four hours a week on campus. A new program, begun in 1993, is a group for "Global Nomads." "Global Nomads" are U.S. American and international students who have spent their formative years living outside their countries of passport due to a parent's or parents' work in the diplomatic corps, military, missionary field, international business areas, or in intergovernmental agencies.

International House also has a visa specialist on the staff who works with students from abroad in fulfilling the various immigration and tax formalities involved in coming to Duke. Further information may be obtained from International House, 2022 Campus Drive, (919) 684-3585.

Office of Intercultural Affairs. The Office of Intercultural Affairs (OIA) has responsibility for identifying and assisting with changes in the Duke University community which promote optimum growth and development for African-American, Asian-American, Latino-American, and Native American undergraduate and postbaccalaureate students. The office conducts such activities as public forums on student life, mentorship projects with university alumni, seminars on current issues for students of color, institutional research on development of students of color, and serves as a resource on issues of students of color for the university community.

The Community Service Center. The Community Service Center is a clearinghouse for the numerous volunteer and community service activities available to students, faculty, and employees. Through the center, members of the Duke community can become involved with student service groups and Durham area agencies doing every-

thing from tutoring and mentoring, helping to care for people with AIDS, and serving meals at local homeless shelters, to befriending senior citizens and earning work-study money in any of over seventy community service internships. The Community Service Center also sponsors speakers, special events, training sessions, and many other programs. In these ways, the center strives to raise awareness about contemporary social issues, to provide opportunities for students to link their service work and coursework, and to be a catalyst for creative partnerships between Duke University and the wider community.

Student Organizations

Duke Student Government. The Duke Student Government (DSG) is the voice of the undergraduate student body of Duke University. DSG is responsible for articulating undergraduate student thought on issues relevant to the university and for working to improve the educational process and university environment. The working philosophy of DSG is that students have the right to participate in the university's decision-making process on matters that affect the student body. Coordinating the efforts of individuals and organizations, DSG lobbies university administrators on practices and policies which govern all facets of life at Duke.

The cabinet is responsible for the implementation of all legislative action and for the coordination of the organization. It consists of the president, five vice-presidents (executive, student affairs, academic affairs, facilities/athletic affairs, and community interaction), an executive secretary, administrative secretary, president pro-tem, chief of staff, attorney general, chief justice, director of public relations, director of student services, treasurer, and director of undergraduate computing.

The DSG legislature is composed of representatives from each undergraduate living group on campus, representatives of students living off campus and on Central Campus, and at-large representatives selected from the entire student body. Position statements and policies are initiated and debated through this body. Representatives then return to their constituencies to discuss the issues at hand. Within the legislative body, there are four standing committees which focus more closely on specific issues and projects. Every representative is required to participate on at least one standing committee. The Student Organizations Finance Committee (SOFC) is the only elected committee from the DSG legislature. The SOFC serves as both an appropriations and advisory committee for student-run organizations. It is responsible for presenting recommendations to the Legislative Body for the allocation of the student activities fee to various chartered student organizations.

DSG not only offers the opportunity for students to have input in university development, but also many unique student services. DSG's services seek to aid every undergraduate during his/her Duke career. These services include free legal advice, check cashing service, a pregnancy loan fund, a bail loan fund, and a computerized ride-rider service.

Cultural and Social Organizations. The scope of the more than three hundred student organizations is suggested by a partial listing of their names: Alpha Phi Omega service fraternity, Black Student Alliance, Baptist Student Union, Cheerleaders, International Association, Duke Ice Hockey, Outing Club, Sailing Club, Model United Nations Club, Photography Group, and the N.C. Rural Health Coalition. Twenty-one national social fraternities and twelve national sororities are represented on campus. They are governed by the Interfraternity and Panhellenic Councils, respectively.

Many opportunities are provided on campus in the areas of music and drama. The Chorale, Modern Black Mass Choir, Chapel Choir, Wind Symphony, Marching Band, Symphony Orchestra, and Collegium Musicum are examples of musical organizations. Duke Drama provides opportunities for non-drama majors to perform established and

experimental drama; Hoof 'n' Horn presents musical comedy; Karamu performs drama related to the black experience.

Several academic departments sponsor organizations and programs for students with special academic or professional interests. There are over twenty academic department majors unions on campus. There are also academic and leadership honorary societies.

Media. The *Chronicle*, the campus newspaper, publishes five issues weekly and is governed by the Chronicle Board. A weekly report of campus information (*The Guide*), a humor magazine (*Jabberwocky*), a literary magazine (the *Archive*), a special topics newspaper (*The Missing Link*), a feature magazine (*Tobacco Road*), a science magazine (*Vertices*), a photography magazine (*Latent Image*), Duke's black literary publication (*Prometheus Black*), a journal of campus news and opinion (*Duke Blue*), and the *Duke Journal of Politics* are published on a regular basis by students. In addition, a *Teacher-Course Evaluation Book*, *The Student Guide to Duke*, *The Duke Women's Handbook*, and a comprehensive yearbook, the *Chanticleer*, are produced each year. These publications are under the direction of the Undergraduate Publications Board, which chooses the editors and business managers and reviews the financial budgets of all such franchised publications. The *DukeEngineer*, the official student magazine of the School of Engineering, appears twice each year and contains articles on technical and semitechnical topics as well as other matters of interest to the school. WXDU 88.7 FM is the student-managed and programmed radio station, broadcasting to the Duke and Durham communities. Duke Union Community Television (Cable 13) is operated by students and produces color television programs that are broadcast throughout the campus on the university cable system. It also produces *Yearlook*, Duke's video yearbook.

Project WILD. Project WILD (Wilderness Initiatives for Learning at Duke) is a unique student organization which, through the practice of experiential education (learning through doing), attempts to ease the transition period into college for Duke students. Run entirely by students, the program strives to teach self-worth, group awareness, and an appreciation of nature. The program has three primary components. The August Course is a twelve-day backpacking expedition in western North Carolina held prior to orientation. The House Course is taught each spring semester and includes a seven-day expedition. The Ropes Course Program is a two- to four-hour experience for groups or individuals and is available to the university community year round.

Health, Physical Education, and Recreation

Besides offering a variety of classes (see the chapter "Courses of Instruction"), the Department of Health, Physical Education, and Recreation also sponsors numerous programs for all students in intramurals, sports clubs, and recreation.

The Intramural Sports Program provides an opportunity for every student to participate in organized recreation competition in forty-nine activities. The program is comprised of four major areas: men's intramurals, women's intramurals, co-rec intramurals, and recreation programs. It is open to all graduate and undergraduate students of Duke University. Participation, not skill, is a major factor that is emphasized in the program.

Thirty-two sports clubs have been chartered by Duke students for those with similar interests to participate in competition and recreational activities. Clubs vary from those which compete with clubs of other universities, such as soccer, rugby, and ice hockey, to those of a more recreational nature such as cycling, and sailing, and one which yearly presents several performances, the water ballet club.

The university's many recreational facilities, available to all students, include the championship Robert Trent Jones Golf Course, tennis courts (some lighted) on both campuses, swimming pools on both campuses, three gymnasiums, a weight training room, squash and racquetball courts, outdoor handball and basketball courts, an all-

weather track, numerous playing fields, jogging trails, and informal recreational areas. Tournaments in recreational sports are often organized and conducted by students. Students may reserve facilities and equipment at designated times.

Intercollegiate Athletics

The Athletic Department fosters intercollegiate athletics by striving for excellence and by providing the best possible framework within which highly accomplished student athletes can compete. The department has a dual responsibility to provide a high-quality athletic program and environment so that all students have the opportunity to compete to the fullest extent of their abilities. Duke is a member of the National Collegiate Athletic Association and the Atlantic Coast Conference (ACC). The ACC consists of Clemson, Duke, Florida State, Georgia Tech, Maryland, North Carolina at Chapel Hill, North Carolina State, Virginia, and Wake Forest.

The intercollegiate program for men includes football, soccer, basketball, cross country, swimming, fencing, wrestling, indoor and outdoor track, baseball, golf, tennis, and lacrosse. The women's athletic program provides intercollegiate competition in basketball, fencing, field hockey, golf, lacrosse, soccer, swimming, tennis, volleyball, indoor and outdoor track, and cross country. Freshmen may participate on all varsity teams.

The director of athletics and associate director of athletics provide departmental leadership and coordinate all athletic policies with the University Athletic Council. The council consists of representatives from the undergraduate student body, the faculty, the administrative staff, the trustees, and the alumni. The council meets with the director of athletics periodically during the school year. The chairman of the council is the official university representative at national and conference athletic meetings.

Duke University Undergraduate Honor Code

An essential feature of Duke University is its commitment to integrity and ethical conduct. The honor system at Duke helps to build trust among students and faculty and to maintain an academic community in which a code of values is shared. Instilling a sense of honor, and of high principles that extend to all facets of life, is an inherent aspect of a liberal education.

As a student and citizen of the Duke University community:

- I will not lie, cheat, or steal in my academic endeavors.
- I will forthrightly oppose each and every instance of academic dishonesty.
- I will communicate directly with any person or persons I believe to have been dishonest. Such communication may be oral or written. Written communication may be signed or anonymous.
- I will give prompt written notification to the appropriate faculty member and to the Dean of Trinity College or the Dean of the School of Engineering when I observe academic dishonesty in any course.
- I will let my conscience guide my decision about whether my written report will name the person or persons I believe to have committed a violation of this Code.

I join the undergraduate student body of Duke University in a commitment to this Code of Honor.

Name

Date

Judicial System and Regulations

Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the university currently in effect, or which are put into effect from time to time by the appropriate authorities of the university. At the same time, the individual is responsible for decisions and choices within the framework of the regulations of the community, as Duke does not assume *in loco parentis* relationships.

Students, in accepting admission, indicate their willingness to subscribe to and be governed by these rules and regulations. They acknowledge the right of the university to take disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the university.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University and, by delegation, with administrative officers of the university. In the undergraduate schools, and in the university as a whole, many of these rules have been established over the years by cooperative action between students, faculty, and administrative officers. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated proposals for policies and rules necessary to assure satisfactory standards in academic and nonacademic conduct. These proposals have been accepted by university officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke. For current regulations, refer to the *Bulletin of Duke University: Information and Regulations*.

Students in Trinity College of Arts and Sciences and in the School of Engineering constitute an undergraduate community whose members are subject to the Judicial Code of the Undergraduate Community. Violations of the code and of certain university regulations by individuals and residential or nonresidential cohesive units are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the academic administration. The Judicial Code of the Undergraduate Community, the constitution of the board, the procedural safeguards, and the rights of appeal guaranteed to students are published in the *Bulletin of Duke University: Information and Regulations* for the undergraduate community.

Student Obligations and Requirements

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the university.

Admission



Principles of Selection

James B. Duke, in his Indenture of Trust, requested that "great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination, and application evincing a wholesome and real ambition for life." Therefore, in considering prospective students, Duke University looks beyond the basic characteristics of academic competence possessed by the majority of applicants. It seeks, regardless of race, color, religion, national and ethnic origin, gender, handicap, sexual orientation or preference, or age, not only evidence of intellectual promise and maturity of judgment, but also a degree of positive energy. Often, this energy is expressed in the form of special talents and accomplishments; it is seen consistently in a student's determination to make creative use of the opportunities and challenges posed by Duke University.

Requirements for Application

As there are occasionally changes in admission policies or procedures after the printing deadline for the *Bulletin of Duke University: Undergraduate Instruction*, candidates are urged to consult the *Bulletin of Duke University: Undergraduate Admission* for specific admissions information, dates, and policies.

DEGREE STATUS

Although there are no inflexible requirements as to subject matter, students are urged to choose a broad and challenging high school program. Candidates for admission should present a minimum of four years of English and at least three of mathematics, natural sciences, a foreign language, and social studies. Applicants to the School of Engineering are advised to take four units of mathematics and at least one unit of physics or chemistry.

All candidates for first-year standing must complete either the College Board SAT-I examination or the American College Test (ACT). Those students who choose to take the SAT-I should also complete three SAT-II exams, including the SAT-II Writing Subject test. Applicants for the School of Engineering should also take a SAT-II test in mathematics (level 1 or 2). Students wishing to continue study or gain course exemption in a foreign language should complete a SAT-II exam in that language. The SAT-I and SAT-II

should be taken by the spring of the junior year for Early Decision and by January of the senior year for Regular Decision.

Students choosing to take the ACT will not be required to submit SAT-I or II scores; however, the ACT will be used for admission only, not for placement or exemption. The ACT should be taken by June of the junior year for Early Decision applicants and by December of the senior year for Regular Decision applicants.

NONDEGREE STATUS

Summer Session. Persons who are or were at the time of leaving their home institutions in good standing in accredited colleges or universities may be admitted for summer study only by the director of the Summer Session.

Continuing Education. Admission as a continuing education student at Duke is limited to adults who live in the Triangle area; Duke graduates; persons who will be moving into the area and plan to reside here for a substantial period of time, for family and work reasons; and local high school seniors. These students are given academic counseling by the Office of Continuing Education; they are subject to most of the regulations set forth for degree candidates.

Application Procedures

DEGREE STATUS

A *Bulletin of Duke University: Undergraduate Admission* and an application may be obtained from the Office of Undergraduate Admissions, Duke University, Box 90586, Durham, North Carolina 27708-0586. A nonrefundable processing fee of \$55 must accompany the first part of the application. Students who would like to make use of the Common Application are encouraged to do so. The Common Application is generally available in secondary school guidance offices.

A personal interview at Duke is not required for admission; students who find it possible to visit campus, however, may call to request an interview. Area alumni interviews are also available for most applicants when Part I of the application or the Common Application has been filed by the deadline. On-campus interviews cannot be granted from mid-December through May, when applications are under review.

Regular Decision. Candidates who wish to enter Duke as first-year students must submit a completed application no later than January 2 of their senior year in secondary school. Decisions are mailed from the university no later than April 3, and accepted candidates are expected to reserve a place in the class by May 1 with a nonrefundable deposit of \$500.

Early Decision. Students for whom Duke is a clear first choice may apply for Early Decision. Candidates who apply for early decision are required to sign a statement confirming their commitment to enroll at Duke if they are admitted in the early decision process and to withdraw applications from other colleges and universities as soon as they learn of their admission to Duke. Students may apply to only one school under a binding early decision plan. Duke reserves the right to withdraw the applications of students accepted to other schools under binding early decision plans. Secondary school counselors and parents are also asked to sign the early decision agreement.

Students applying for Early Decision should submit a completed application by November 1. The SAT I and II or the ACT examinations should be taken in the spring of the junior year. Early Decision applicants who have not completed their standardized tests may be deferred to Regular Decision. Applicants are notified of their status—admit, defer, or deny—by December 15. Admitted students pay a nonrefundable deposit of \$500 by January 2. The credentials of candidates who are deferred are considered along with candidates for Regular Decision. Deferred students are no longer bound by the

early decision agreement and are free to accept offers of admission from other colleges and universities.

This plan is designed to give well-qualified students who know Duke is their first choice a means of indicating that commitment to the university and of receiving a decision early enough to eliminate the necessity of applying to several colleges.

Midyear Admission. Midyear admission, when offered, allows a limited number of students to begin their college work a semester early or to postpone matriculation for a semester. Midyear applicants are expected to complete all the requirements for fall admission. The application deadline for new candidates is October 15; students will be notified of the decision on their applications by November 15, with the expectation that those who are accepted will reply by December 1 with a nonrefundable deposit of \$500. **Midyear admission is not offered each year and has not been offered during the last several years. Interested candidates should consult the admissions office to see if the program is offered in the coming year.**

Transfer Admission. Transfer admission from other accredited institutions may be arranged for a limited number of students each semester. Because the transcript of at least a full year of academic work is preferred by the Admissions Committee, and because transfer students are required to spend their last two years at Duke, most candidates apply to Duke preceding or during their second year of college. Candidates submit official transcripts of all work completed at other accredited colleges, high school records, scores on the SAT or ACT, and employment records if there has been an extended period of employment since graduation from secondary school, along with completed application forms. See the section on transfer credit in the chapter "Academic Procedures and Information."

September (fall semester) transfer students meet an April 1 deadline for a completed application, learn of their decisions by May 15, and respond to the university by June 1 with a nonrefundable deposit of \$400, or \$500 if housing is requested. January transfer students submit a completed application by October 15, learn of their decisions by November 15, and reply to the university by December 1.

NONDEGREE STATUS

Summer Session. Application forms and schedules of courses may be obtained by writing or calling the Office of the Summer Session, Box 90700, Duke University, Durham, North Carolina 27708-0700, (919) 684-2621. No application fee is required.

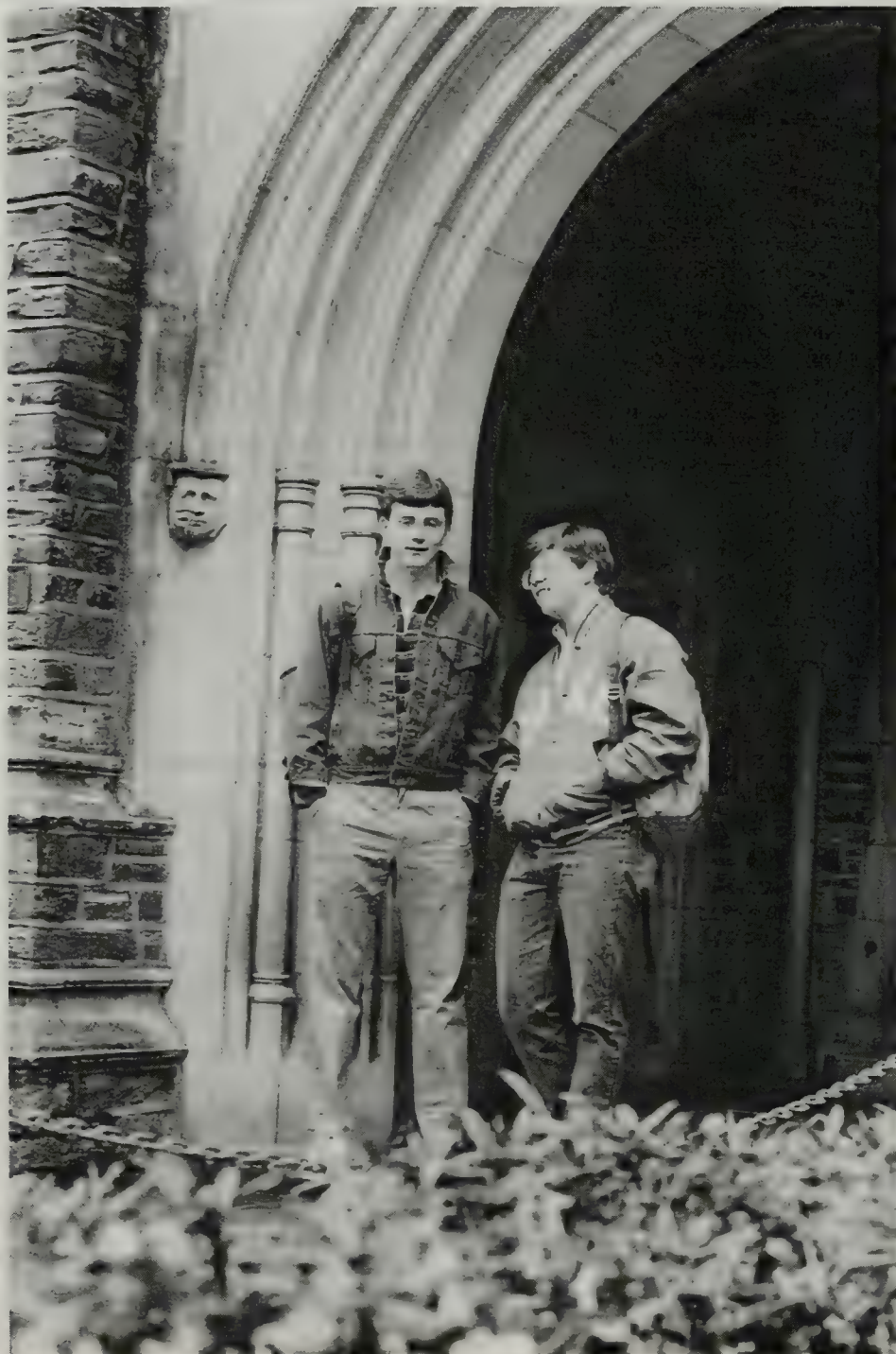
Continuing Education. Applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office, accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

A certain grade point average over four courses must be attained before a nondegree student may apply for degree candidacy. More detailed information on nondegree course work through Continuing Education is available from the Office of Continuing Education, Box 90700, Duke University, Durham, North Carolina 27708-0700.

READMISSION OF FORMER STUDENTS

A student who desires to return, following withdrawal from college, should apply to the appropriate college or school. (See the section on readmission procedures in the chapter "Academic Procedures and Information.")

Financial Information



Tuition and Fees*

No college or university can honestly state that an education at the college level is inexpensive. Fees paid by students cover less than half the cost of their instruction and the operation of the university. Income from endowment and contributions from alumni and other concerned individuals meet the balance and assure each student the opportunity to pursue an education of unusually high quality.

Students are urged to give their attention first to the selection of institutions which meet their intellectual and personal needs, and then to the devising of a sound plan for meeting the cost of their education. This process will require an in-depth knowledge of both the university's financial aid program and the resources of the student's family. A brochure describing in detail the various forms of financial aid may be obtained from the Office of Undergraduate Financial Aid, Box 90397, Duke University, Durham, North Carolina 27708-0397.

Estimated Expenses.* Certain basic expenditures, such as tuition, room, and board, are considered in preparing a student's budget. These necessary expenditures, with a reasonable amount allotted for miscellaneous items, are shown below:

	<i>Academic Year, 1995-96</i> (two semesters)	<i>Two Summer Terms, 1995</i> (one semester equivalent)
Tuition		
Trinity College		
-Returning	\$18,400	\$5,388-6,286
-Entering	\$19,500	\$5,388-6,286
Engineering		
-Returning	\$19,730	\$5,388-6,286
-Entering	\$20,280	\$5,388-6,286
Residential Fee		
Single Room	\$4,301-5,157	N/A
Double Room	\$3,245-3,889	\$810
Food		
100% board plan	\$3,360	\$1,200†
75% board plan	\$2,780	\$740†
Books and Supplies	\$660	\$310
Student Health Fee	\$384	\$120

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. The average Trinity College

*The figures in this section are projections and are subject to change.

†These estimates are for use with debit accounts.

student, however, can plan on a budget of approximately \$28,080 for entering students and \$26,980 for continuing students. The budget estimate for the summer (two terms, one semester equivalent) is \$8,267. These budgets are all-inclusive except for travel costs and major clothing purchases.

Registration Fees and Deposits for Fall and Spring. On notification of acceptance, students are required to pay a nonrefundable first registration fee of \$40, a one-time transcript processing fee of \$30, and to make a deposit of \$430. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$100 of the deposit serves as a continuing residential deposit for successive semesters, \$30 covers the transcript fee, and the remaining \$330 serves as a continuing registration deposit.

Late Registration. Continuing students who fail to register during the registration period must pay a fee of \$50 to the bursar.

Part-Time Students. In the regular academic year, students who register for not more than two courses in a semester are classified as part-time students. Part-time students will be charged at the following rates: one course, returning students, \$2,300, entering students \$2,438 (for engineering courses, \$2,466 and \$2,535); half course, returning students \$1,150, entering students \$1,219 (for engineering courses, \$1,233 and \$1,268); quarter course, returning students \$575, entering students \$609 (for engineering courses, \$616 and \$634). Registration for more than two courses requires payment of full tuition. Graduate students registered for undergraduate courses will be assessed three units for nonlaboratory courses and four units for laboratory courses. Men and women in nondegree programs who are being considered for admission to degree programs, as designated by the Office of Continuing Education, pay fees by the course whether the course load is one, two, or three courses.

Auditing one or more courses without charge is allowed for students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for one or two courses may audit other courses by payment of \$230 for returning students, \$244 for entering students for each course audited. With the consent of the appropriate instructor and the director of Continuing Education, graduates of Duke may audit undergraduate courses for the above payment per course.

Payment of Accounts for Fall and Spring. The Office of the Bursar will issue invoices to registered students for tuition, fees, and other charges approximately four to six weeks prior to the beginning of classes each semester. The *total amount due* on the invoice is payable by the invoice late payment date which is normally one week prior to the beginning of classes. Inquire at the bursar's office, (919) 684-3531, if an invoice has not been received three weeks prior to the first day of classes, so that payment can be forwarded while a duplicate invoice is issued to document the balance owed. *As part of the admission agreement to Duke University, a student is required to pay all invoices as presented.* If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. Nonregistered students will be required to make payment for tuition, fees, required deposits, and any past due balance at the time of registration.

Monthly Payment Option. The Monthly Payment Option Plan allows students and their parents to pay all or part of the academic years expenses in ten equal monthly payments from July 1 to April 1. The only cost is an annual, nonrefundable fee of \$100. The participation fee can be paid by Visa or Mastercard. Payments may be made by check or by bank draft. Questions regarding this plan should be directed to Tuition Management Services, 1-800-722-4867 or 401-849-1550. At renewal, the plan can be extended to twelve months. The monthly payments can be increased or decreased without additional cost.

Late Payment Charge. If the total amount due on an invoice is not received by the invoice late payment date, the next invoice will show a penalty charge of 1 1/4 percent per month assessed on the past due balance regardless of the number of days past due. The past due balance is defined as the previous balance less any payments and credits received on or before the late payment date and also any student loan or scholarship memo credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default if the total amount is not paid in full by the due date. A student in default will not be allowed to receive a transcript of academic records, have academic credits certified, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school and have the account referred to a collection agency. If an account is referred to a collection agency, the individual will be responsible for all applicable collection and/or court costs.

Fees for Study Abroad. Students who register to study abroad on programs administered by institutions other than Duke University will pay the tuition and fees of the administering institution. There will be a fee of \$1,500 per semester, or \$750 per each summer session, payable to Duke University to maintain a student's enrollment at Duke.

Tuition and Fees for Summer Session. Tuition for undergraduates is \$1,347 for each 3 semester hour (s.h.) course, \$1,796 for each 4 s.h. course, \$898 for each half course (2 s.h.), and \$2,694 for each one and one-half course program (6 s.h.) offered at the Marine Laboratory.

Tuition for graduate students taking an undergraduate course is as indicated above.

Health Fee. All Duke students and all full-time non-Duke students are required to pay \$60 per term. All students at the Marine Laboratory are required to pay \$52 per five-week registration period.

Music Fee. A fee of \$145 will be charged for Music 81 and 85. A fee of \$290 will be charged for Music 91 and 95.

Auditing Fees. With permission of the instructor and the director of the Summer Session, students registered for a full course program (two courses) may audit one nonlaboratory course except a physical education and dance activity course, a studio art course, an applied music course and foreign programs. No extra charge is made.

Students carrying less than a full course program may be granted permission by the instructor and the director of the Summer Session to audit a course (the above exceptions apply) but must pay half the university fee for the course if it is in Arts and Sciences. Professional school course audit policies may differ.

Late Fee. Students who fail to register and pay all tuition and fees before five full working days prior to the beginning of the term will pay an extra charge of \$25.

Payment of Tuition and Fees. The university does not mail statements in time to meet summer session tuition deadlines. All summer tuition and fees (which students must calculate from the information above) and any past due balance should be paid in the Office of the Bursar (101 Allen Building) at least five full working days prior to the beginning of the term (see Summer Session calendar). Students paying by mail may forward payment to the Office of the Bursar, 101 Allen Building, Duke University, Durham, North Carolina 27706. Students who fail to pay tuition and fees and/or otherwise fail to clear with the bursar by the end of the drop/add period will be withdrawn from their courses. These withdrawn students will be billed the health fee and an administrative withdrawal fee of \$150 per course (\$75 per half-course) for which they were registered. (See the section on Refunds and Administrative Withdrawal Charges concerning penalties in this chapter). Students who, subsequent to withdrawal, clear with the bursar may, with written permission of their academic dean, be reinstated in their classes as originally registered. The administrative withdrawal fee will stand and the student will be liable for full tuition and fees. Students who are unable to meet

these deadlines should consult with the bursar and their academic dean prior to the deadline.

Transcripts. Requests for transcripts of academic records should be directed to the associate registrar. Ten days should be allowed for processing. Transcripts may be withheld for an individual whose student loan account is past due.

Duke Employees. With the permission of their supervisors, employees may, through the Office of Continuing Education and University Summer Programs, take up to two courses for credit or audit during any one semester or one during a summer term. A formal application for credit course work must be submitted by August 1 for the fall semester or December 1 for the spring semester. No formal application is required for auditing. Half-time employees with one or more years of service who receive permission to take such courses will be charged one-half the tuition rate shown above for part-time students during the fall and spring and one-half of the summer tuition rate. This benefit applies only to nondegree work. Full-time (thirty or more hours a week) employees with two or more years of service who receive permission to take such courses will be charged one-tenth the tuition rate for credit course work and will be permitted to audit at no charge. This benefit continues after degree candidacy has been attained. Eligible employees should consult the Benefits Office, 705 Broad Street (919) 684-6723, at least one week in advance of payment date to obtain the appropriate tuition voucher. The director of Continuing Education and University Summer Programs is available to advise Duke employees on educational matters (919) 684-6259.

Living Expenses*

Housing for Fall and Spring. In residence halls for undergraduate students the housing fee for a single room (air-conditioned) ranges from \$4,278 to \$5,134 for the academic year; for a double room, the fee ranges from \$3,245 to \$3,889 per occupant.

Detailed information concerning the student's obligations under the housing contract and the consequences of failure to comply are published in the *Bulletin of Duke University: Information and Regulations*.

Housing for Summer. For detailed information on types and costs of accommodations available at Duke University for the Summer Session write: Department of Housing Management, 218 Alexander Avenue, Apartment B, Durham, North Carolina 27705.

Food and Other Expenses. Duke Dining Services and Duke University Stores operations are located on campus to serve the needs of the Duke community. The university identification card, known as the DUKECARD, can be used to gain access to prepaid accounts and make purchases in many Duke University facilities.

There are two accounts: the dining account, used to purchase food items in Duke Dining Services and Duke Stores operations; and the flexible spending account, used to purchase any goods or services from Dining Services, Duke Stores, and other operations.

A dining account is required for all undergraduate students who live in the residence halls. The five declining balance plan levels (Plan A–Plan E) range from \$965 to \$1,680 per semester. The flexible spending account is optional and may be set for \$25 or more. Additional funds may be added to either account at any time. An optional summer dining plan is provided in three plan levels ranging from \$150 to \$595 per six-week summer term.

*The figures contained in this section are projections and are subject to change prior to the beginning of the fall 1995 semester.

Information regarding these accounts is sent to matriculating students. For more information about campus retail and food facilities, see the chapter "Campus Life" in this bulletin.

Fall and Spring Refunds

In the case of withdrawal from the university, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

Withdrawal	Refund
Before classes begin	Full amount
During first or second week	80 percent
During third, fourth, or fifth week	60 percent
During sixth week	20 percent
After sixth week	None

Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward. In the event of death, a full tuition, fees, and residence hall refund will be granted. In case of a call to military service, a full semester's tuition, full purchase price of textbooks from the university's book store, and the pro rata amount of the room charge will be refunded. The outstanding balance of the food service plan will be refunded in case of military service or death.

In the case of dropping special fee courses (e.g., music, art, golf), or of part-time students dropping audit courses, a full refund will be granted students during the drop-add period. Students changing status to part-time are required to request permission at the time of preregistration; therefore, no refunds are granted during the drop/add period or subsequently for changes which involve carrying less than a full-time load.

The registration deposit will be refunded to students whom the university does not permit to return, who graduate, or who request the refund prior to registration, thereby indicating their intention not to return for the following semester. The registration deposit will not be refunded to students who register for the following semester but fail to enter. Arrangements for refund of the \$100 residential deposit are described in the housing contract.

The remaining balance is any registration deposit applicable to a graduated student who did not reside on campus in the semester preceding graduation will be refunded within four weeks following graduation. The remaining balance of both housing and registration deposits applicable to a graduated student who did reside on campus in the semester preceding graduation will be refunded within seven weeks following graduation.

Because Duke University participates in the Title IV federal aid programs, it follows federal guidelines with respect to the refund and repayment of these funds. All first-time students who withdraw within 60 percent of the enrollment period will have their charges and financial aid adjusted according to the federal regulations. Additional information regarding this procedure may be obtained from the Office of Financial Aid.

Summer Administrative Withdrawal Charges and Refunds*

Drop or Administrative Withdrawal Charges. Students who will not be attending a summer term or course for which they have registered (i.e., have scheduled a course through the telephone registration system) must officially drop the course(s) prior to the beginning of the term whether or not they have paid tuition and fees. (See the section

*This policy does not apply to foreign program students.

on course changes for the summer term in the chapter "Academic Procedures and Information.") Students who fail to drop the course(s) prior to the beginning of the term will be charged \$150 per course (\$75 per half-course).

Refunds (Except Foreign Programs). Students who will not be attending a summer term or course for which tuition and fees have been paid are eligible for refunds following these policies:

1. There is no refund of tuition and fees if the student drops a course(s) or withdraws from the term after the third day.
2. Full tuition less \$150 per course (\$75 per half-course) is refunded if the student officially drops a course(s) or withdraws from the term during the first three days. The health fee is not refunded. (There is no charge for drop / adds that result in no change in course load in the same term.)
3. Full tuition and fees are refunded if the student officially drops a course(s) or withdraws from the term before the first day.

Student Aid

Duke University is strongly committed to its financial aid program and, for the four years of undergraduate enrollment, will meet 100 percent of the demonstrated need of each eligible admitted student. The university's aid program includes both merit and need-based scholarships, work-study, the Federal Pell grant program, the Federal Perkins Loan, and the Federal Stafford Student Loan Program. Since admissions decisions are made without reference to a student's application for aid, students needing assistance are strongly encouraged to apply for financial aid at the same time as for admission. Students receiving financial aid will be notified at the same time that they are offered admission.

For the student with demonstrated need, the net cost of an education at Duke University will generally be no greater than that for attendance at any college or university. It is the intention of the Office of Undergraduate Financial Aid to set each award at a level consistent with a family's ability to meet the costs of attending Duke University. This will be done by taking into consideration the contribution that can reasonably be expected from the student, the family, and any available outside sources. During the current academic year, over 40 percent of the student body receives more than twenty-one million dollars in aid of various types.

Financial Aid for Entering Freshmen. Candidates should initiate their application for financial aid concurrently with their application for admission during the fall semester of their senior year in secondary school. Instructions concerning the specific requirements and deadline dates will accompany application materials. To receive institutional funds, two forms must be submitted, the Free Application for Federal Student Aid (FAFSA) to the federal processor and the PROFILE application to College Scholarship Service. Students applying for federal loans and grants need to complete only the FAFSA. The custodial parent should submit a PROFILE and FAFSA. The noncustodial parent must submit the Divorced/Separated Parent's Statement which may be obtained from either the high school guidance office or the Financial Aid Office. A copy of all pages, including schedules and attachments, of both parents' and student's current federal income tax form must be submitted to the Financial Aid Office on or before May 1. Information provided on the FAF will be verified through the use of the tax return.

Financial aid recipients wishing to operate a motor vehicle on campus must first register it with the Financial Aid Office. As an automobile represents an asset, the value of a financial aid recipient's car will be considered in the estimation of a student's need. As a general rule, a student's annual contribution will be increased by 35 percent of the value of the car.

Renewal of Financial Aid after the Freshman Year. Each year students must file an application for renewal of financial aid. This application must include a new Financial Aid Form, a new Free Application for Federal Student Aid, and a copy of all pages, including schedules and attachments, of the parents' and student's current federal income tax return and a Duke Application for Financial Aid. Application packets may be picked up in the Financial Aid Office in mid-December. The deadline for the receipt of all application materials by the Financial Aid Office is April 16. Failure to meet this deadline may affect the type and amount of aid offered. All qualified students may receive need-based aid for up to eight semesters. Under certain circumstances consideration will be given to a ninth semester of eligibility.

To have financial aid renewed, a student must meet the continuation requirements outlined on pages 23, 24, and 35, as appropriate. Students not qualifying for financial aid due to their inability to meet these requirements may appeal directly to the Financial Aid Office. Students holding merit scholarships are required to maintain an average considerably higher than the minimum required for need-based financial aid recipients. Specific details regarding retention standards are outlined on page 106 and will be provided to scholarship winners.

Summer School Financial Aid. Financial aid is generally available for each summer session. Interested students can obtain specific details as to available funding and an application through the Financial Aid Office in March of each year.

Types of Financial Aid. Gift scholarships or grants, long-term loans, and employment are integral parts of the financial aid program, and some portion of the aid offered an undergraduate is normally in each of these forms.

The work-study opportunity and loan(s) offered as financial aid are considered to be the self-help portion of the award. The standard aid package at Duke provides that the first \$1,700 to \$5,500 of each student's need be awarded in the form of self-help funds. Funds awarded in excess of this amount will generally be grant funds. This combination of university grant funds and opportunities for self-help enables Duke to extend its resources to a larger number of deserving students.

Duke has a number of scholarships based on merit which are available from personal endowments and corporations. Most are intended for entering freshmen, whereas a few are awarded to upperclass students. These scholarships may be based on achievement in a particular field or on an outstanding overall record.

Gift Scholarships. The following are among the named gift scholarships offered through Duke University. Where specified, these scholarships are renewable for four (4) years of undergraduate study for those students meeting the following academic standards:

Renewable merit scholarships will be continued for freshmen who complete the first year of studies with a 2.8 average or higher. Upperclass students must complete each academic year with a 3.0 average or higher. Students failing to meet these standards will be placed on probation for one semester during which they must maintain a 3.0 average or higher. Failure to maintain a 3.0 average or higher in subsequent semesters will lead to cancellation of the scholarship.

Angier B. Duke Memorial Scholarships. The Angier B. Duke Memorial Scholarships, competitively awarded on the basis of academic merit, have been established to encourage the intellectual achievement of men and women by recognizing those who possess outstanding academic and leadership abilities. Candidates are selected on the basis of intellectual performance, creative talent, and promise of being eventual leaders in whatever field of endeavor they choose. The scholarship is a four-year program (eight semesters), and a student's continuation in the program is contingent upon good academic performance. All 1994-95 freshman scholarship holders received \$18,590 if enrolled in Trinity College of Arts and Sciences, and \$19,300 if enrolled in the School of Engineering. Students demonstrating additional need will receive a grant from Duke University funds up to the amount needed. All Angier B. Duke Scholars participate in a six-week summer study program at Oxford University in England after the junior year. Under the Oxford program the scholarship pays tuition, single room accommodation, full board, designated excursions for all scholars, and an allowance for transatlantic air fare between New York and

London. Those choosing not to participate in the Oxford program are eligible for a \$2,000 grant for an approved independent project. At least one of the four years of the scholarship could be used abroad on an approved program.

W. N. Reynolds Memorial Scholarships. Recipients of these awards are students with outstanding ability and/or need who show promise of constructive leadership. In considering candidates for the awards, consideration will be given in the following order: (1) children of employees of R. J. Reynolds Tobacco Company or any of its affiliates or subsidiaries; (2) children of families residing in Forsyth County, North Carolina; and (3) other candidates who are residents or natives of North Carolina. There are a number of awards available for each freshman class with a minimum value of \$500.

Lionel Hampton Scholarship. This award of \$500 (not renewable) is given to an incoming freshman who demonstrates high proficiency in a musical instrument and strong potential in jazz performance.

United Methodist Scholarships. A number of United Methodist Scholarships are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship groups.

Alice M. Baldwin Scholarships. One or more of these scholarships, varying in amount from \$500 to \$2,500, are awarded to women who are rising seniors in Trinity College of Arts and Sciences on the basis of scholarship, character, leadership, and need.

Panhellenic Scholarship. A scholarship of approximately \$1,000 is awarded to an upperclass woman in Trinity College of Arts and Sciences on the basis of scholarship, character, leadership, service, and need.

J. A. Jones Memorial Scholarships. These scholarships, sponsored through the Jones Fund for Engineering, are awarded to engineering students whose outstanding academic and personal qualifications suggest that they will become leaders in a technological society. The awards range from \$1,000 to \$3,000, depending on each recipient's financial need.

Robert H. Pinnix Scholarships. The Robert H. Pinnix Scholarships are awarded annually to two upperclassmen enrolled in the Duke School of Engineering. The award is based upon demonstrated ability, excellence in engineering, and financial need.

Richard Miles Thompson Scholarships. The Richard Miles Thompson Scholarships are awarded annually to two upperclass students enrolled in the School of Engineering. The awards are based upon academic merit and demonstrated financial need.

The Mary Duke Biddle Scholarship in Music Composition. This scholarship with a stipend of up to \$3,500 per year is available to a member of each entering class. It is renewable annually as long as the student meets the required standards for renewal. Students wishing to apply for this award will be required to submit examples of their composition. Eligibility is limited to students planning to major in music.

The William O'Connor Memorial Scholarship. This music scholarship of up to \$2,500, established by the Mary Duke Biddle Foundation in honor of William O'Connor and in appreciation for his many years of service to the foundation, is awarded to student of a string instrument or organ.

The A. J. Fletcher Scholarship. This scholarship of \$7,500 is offered annually to an incoming first-year student, who intends to major in music and who can demonstrate, by tape or audition, talent and achievement in instrumental or vocal performance, or in the case of composition, by submission of a representative portfolio. It is renewable annually as long as the student makes satisfactory progress.

Air Force ROTC College Scholarship Program. Students can apply for three-year scholarships during their freshman year and two-year scholarships during their sophomore year. Scholarships are available to qualified students who major in certain scientific or engineering fields. The scholarships include tuition, fees, and textbook reimbursement, plus a \$100 per month tax-free allowance.

Army ROTC Scholarship Program. All freshman and sophomore students are eligible to apply for Army ROTC scholarships. Awarded without regard to academic major, these grants pay tuition, fees, and textbook/equipment costs in addition to providing a tax-free monthly stipend of \$100 for the balance of the student's normal period to graduation. Commissioned service, following graduation, can be either on active duty or with the reserve forces. Additional information concerning Army ROTC scholarships is available from the professor of military science.

Navy ROTC College Scholarship Program. This program provides for up to four years' tuition and textbooks, laboratory fees, and a \$100 per month stipend. These scholarships, based upon academic achievement, leadership potential, and overall performance, can be awarded at any stage of the student's college career through either a nationwide selection process or by the Professor of Naval Science at the university. In addition, two other two-year scholarships are available to rising juniors: one leads to a career in nuclear power, and the other follows a summer attendance at the Naval Science Institute at Newport, Rhode Island. For further information on any of the above scholarship programs, contact the professor of naval science.

Reginaldo Howard Scholarships. These scholarships, awarded annually to freshman minority students, are provided to honor the late Reggie Howard, first black president of the student government. Seven scholarships for \$6,000 are awarded each year. Scholarships are available for the four years of undergraduate study as long as the student maintains the academic average specified for renewal.

The Anne McDougall Memorial Award. The Anne McDougall Memorial Award for Women is awarded each year to one woman student studying psychology or a related field. Administered through women's studies, this \$1,000 award is intended to provide encouragement and support for women who wish to pursue academic study and continue in the area of human service.

The Janet B. Chiang Memorial Scholarship Fund. This fund was created by the family and friends of Janet B. Chiang. An award is made annually to a student who has demonstrated strong leadership qualities and a strong interest in his or her Asian cultural heritage.

The Beth Gotham Semans Drama Scholarships. These awards are made annually to currently enrolled undergraduate students who have been and continue to be active in drama, with preference given to African American and other minority students. Applicants need not be drama majors but must demonstrate significant involvement in dramatic activities. Awards range from \$1,000 to \$2,500; decisions are made by a special committee appointed by the Drama Program.

Emma A. Sheaffer Drama Scholarships. These scholarships are awarded to talented prospective drama students who would not be able to attend Duke University without financial assistance. Awards shall be made to a single individual or to several qualified students in need, with first preference to students from the New York metropolitan area. Awards range from \$1,000 to \$5,000. Interested incoming students should apply to the director of the program.

The Steven and Toby Korman Drama Scholarships. The scholarship shall be awarded annually to a student(s) who has demonstrated exceptional talent and ability in the field. Awards range from \$1,000 to \$5,000. Interested students should apply to the director of the program.

Kohler Scholarships in Drama. Several awards each year ranging from \$250 to \$1,000 are given to students active in the Drama Program. Awards are based on a nondiscriminatory basis with regard to color, sex, and religion. Interested students should apply to the director of the program.

The Roger Alan Opel Memorial Scholarship. A grant is awarded annually to a Duke student who will spend a year of undergraduate study at a British university. The student is selected on the basis of intellectual curiosity, academic ability, and financial need. The award was established by the parents of Roger Alan Opel, a senior at Duke University who was killed in November, 1971.

Alumni Endowed Scholarships. Three \$8,000 per year Alumni Endowed Undergraduate Scholarships are awarded to students who demonstrate superior academic ability and leadership potential. These awards are renewable annually for those meeting the stated requirements. Although not restrictive, preference is given to children of alumni.

Scholarships for North Carolina Residents

The Benjamin N. Duke Scholarship Fund. Established by the Duke Endowment to honor Benjamin N. Duke, this fund is intended to encourage the enrollment of students from North Carolina and South Carolina.

The Benjamin N. Duke Leadership Award. As part of the Benjamin N. Duke Scholarship Fund, these awards recognize and encourage leadership potential and community involvement of students from North and South Carolina. Ten scholarships, valued at 75 percent of tuition, are awarded annually.

The Benjamin N. Duke Scholarship Fund also provides a number of grants which replace what would normally be the loan portion of need-based awards received by students from North Carolina and South Carolina. This fund can allow need-based aid recipients from the Carolinas to graduate debt free following the eight standard semesters of enrollment.

Trinity Scholarships. Awarded to North Carolinians of exceptional ability, these scholarships are named to honor the fact that Duke University was originally named Trinity College. Trinity scholarships provide each winner an award equal to the value of tuition, fees, room, board, and the cost of a summer program.

North Carolina Math Contest. Upon enrolling at Duke, the top student finishing in the top ten in the North Carolina Math Contest taken as a high school senior is eligible to receive a scholarship equal to the amount of tuition. This scholarship is available for each of the four years of undergraduate enrollment as long as the student maintains the specified average. Winners must have applied to and been accepted by Duke University.

The Perry Family Scholarship. Awarded to students from Winston-Salem and the Forsyth County area, this scholarship, valued at \$5,000, is awarded every other year. Recipients of the scholarship will be required to demonstrate high academic achievement as well as leadership and/or involvement in

extracurricular activities. The scholarship is available for four years if the student meets the specified academic requirements.

J. Welch Harriss Scholarships. Recipients of these scholarships will receive \$1,000 per year without reference to need. If demonstrated need exceeds \$1,000, then the scholarship will be adjusted accordingly. These awards are made to entering freshmen who have achieved outstanding academic records. They are renewable each year as long as the student maintains the required average. Consideration will be given in the following order: (1) students from High Point, North Carolina; (2) students from Guilford County, North Carolina; and (3) students from North Carolina.

Allyse Smith Cooper Scholarships. Each year scholarships of various amounts are awarded to students demonstrating both merit and need. Preference is given to students from Alamance County, North Carolina.

Braxton Craven Endowed Scholarships. Recipients of these scholarships will receive an amount equal to the current tuition at Duke. Braxton Craven scholars will be chosen on the basis of outstanding academic and extracurricular achievement and need. First preference is given to students from North Carolina. The scholarships are approved on a continuing basis, provided that the recipient complies with the specified academic requirements.

The John M. and Sally V. Blalock Beard Scholarship. These scholarships are awarded annually to outstanding students from the Wake County area of North Carolina who major in English or the history of the United States. These awards are based on financial need, scholarship, character, and academic achievement.

North Carolina Legislative Tuition Grant. The North Carolina General Assembly has established a program of tuition grants available to North Carolina residents who are full-time students at private colleges and universities in the state of North Carolina. The grant for each eligible student is approximately \$1,250 per year. Applications will be mailed to all eligible students during the summer. In the case of a need-based financial aid recipient, this grant reduces a student's tuition and therefore his budget. All qualified need-based aid recipients are required to apply for this grant.

State Contractual Scholarships for Needy North Carolinians. Funds provided by the state of North Carolina through the Legislative Grant Program are distributed to needy North Carolinians qualifying for the State Contractual Scholarship Program. Application is made through the College Scholarship Service's PROFILE.

Loans. The loan programs which are available to students through Duke University are listed below:

Federal Perkins Loan. Loan funds supplied by the federal government and Duke University through Part E of Title IV of the Higher Education Act of 1965 are available to qualified students. Repayment of loans under this act normally begins nine months after the student has graduated or leaves college, with complete payment scheduled within a ten-year period. Interest accrues at the rate of 5 percent annually, commencing nine months after the borrower ceases to be at least a half-time student at an institution of higher education. This loan is part of the student's financial aid award.

Federal Stafford Student Loan Program. Loans under the Federal Stafford Student Loan program are available from banks or other incorporated state lending agencies. Duke University can arrange an alternate lender for students who are unable to obtain these loans through their home state agencies or local banks. Need as established by the federal government's formula will be considered in the university's decision regarding applications. The annual limit on a loan, which has a variable interest rate that is capped at 8.25 percent, is \$2,625 for freshmen, \$3,500 for sophomores, and \$5,500 for juniors and seniors. Repayment begins six months after the student leaves school.

Students may apply for Stafford loan funds by submitting a loan application directly to the Financial Aid Office. In addition, loan applicants must submit the Free Application for Federal Student Aid to the federal processor. Additional information about this loan program may be obtained from the Undergraduate Financial Aid Office.

Federal Parents' Loan for Undergraduate Students Program. Parents may borrow up to the cost of education less financial aid through the Federal Parent Loan for Undergraduate Students (PLUS) program. Repayment of these loans begins sixty days after loan disbursement. Interest is based upon treasury bill rates but will be no higher than 9 percent and begins to accrue at the point repayment begins. Interested parents should contact their home state lending agency or the financial aid office.

Federal Unsubsidized Stafford Loan Program. All undergraduate students, regardless of need, are eligible to borrow an Unsubsidized Stafford Loan. The loan limits and the interest rate are the same as for the subsidized Stafford Loan described above. Although repayment of the principal begins six months after the student leaves school, interest payments begin 45 days after the first disbursement of the loan.

Share Loans. "Share" is a supplemental educational loan program developed specifically to help families meet the costs of higher education. Credit-worthy families, regardless of income, may be eligible

to borrow through this program. Annual loan amounts range from \$2,000 to up to the cost of education less financial aid. The interest rate is variable, and Share offers several repayment options.

Children of Methodist Ministers. Children of ministers in the North Carolina and the Western North Carolina Annual Conferences of the United Methodist Church may be eligible to receive a partial tuition grant of \$750 per semester for a maximum of eight semesters of undergraduate study at Duke University. Eligibility is met by the parent being in a regular pastoral appointment and resident in one of the conferences. When the parent is in a special appointment and resident in one of the conferences, eligibility will be determined on an individual basis, depending upon the nature of the appointment. In all cases the decision of the university will be final.

Employment. Most financial aid recipients are offered a job as part of their aid package. These jobs require between ten and fifteen hours a week and provide an average stipend of \$1,700. The money is paid directly to the student. The Office of Undergraduate Financial Aid maintains part-time employment listings for the campus and Durham area. All students interested in working during the school year should inquire at Student Employment in the Financial Aid Office at the beginning of the semester. Every effort will be made to help students find jobs consistent with their interests.

Duke University also expects that students receiving financial aid will work during the summer. In the year before entering college, a freshman should save a minimum of \$1,600 for use during the first year of college. In subsequent years, minimum student earnings will be \$1,900 for sophomores, \$2,000 for juniors, and \$2,100 for seniors. These figures are viewed as estimates and are revised consistent with actual earnings.

Duke University offers subsidized employment opportunities to many students not qualifying for need-based financial aid. Interested students should submit the appropriate aid applications.

Financial Plans. There are three plans available to assist parents and students in fulfilling financial obligations. More information about each described can be obtained from the Office of Undergraduate Financial Aid.

Tuition Plans. Many families finance a college education with the assistance of an insured tuition payment plan regardless of whether they receive financial assistance from Duke. Although these plans are sponsored by a number of private firms, the university refers parents to plans provided by the Richard C. Knight Insurance Agency, Inc. The company provides the university with the full sum required each semester and arranges a schedule for monthly repayment by the subscribing families. The schedules for repayment vary with the program offered by the company. Additional information on this particular tuition payment plan may be obtained by writing to Richard C. Knight Insurance Agency, Inc., Insured Tuition Payment Plan, 53 Beacon Street, Boston, Massachusetts 02108.

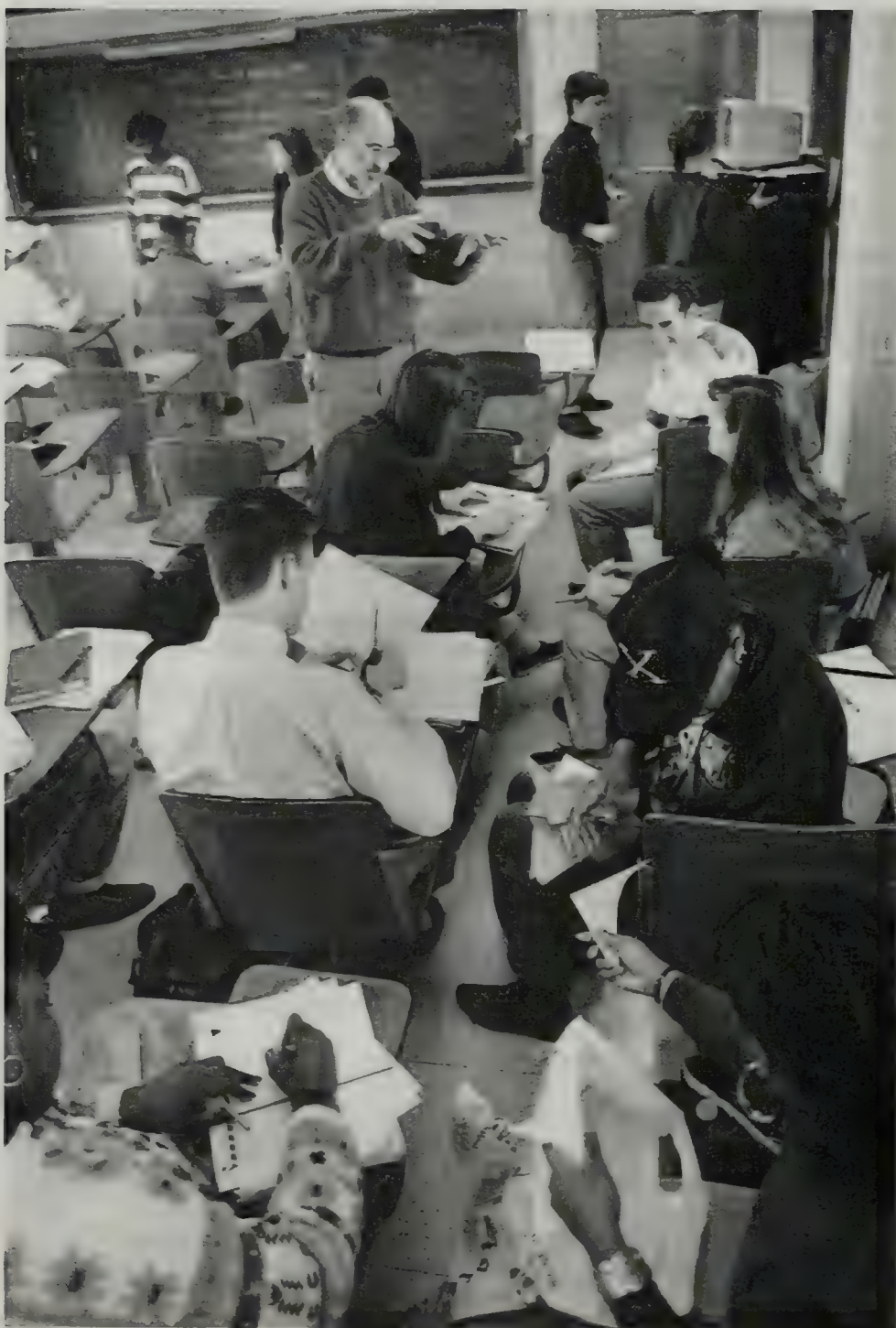
Tuition payment plans are also available through the Tuition Plan, Concord, New Hampshire 03301. Each year the Tuition Plan will send information to all students.

Payment Plan. The university is pleased to offer a twelve-month payment plan through Tuition Management Systems.

Loan Plans. Duke is pleased to offer the Duke Achiever Loan through Richard Knight. This plan offers three loan and payment options to families, including the ability to borrow the entire cost of enrollment for four years at Duke.

Of additional assistance is the SHARE Loan Program. Using this program, parents may borrow between \$2,000 and the cost of education less financial aid annually to meet their children's costs of education. Repayment may be made over twenty years.

Courses of Instruction



Definition of Terms

Courses taught in 1993-94 or in 1994-95 or scheduled for 1995-96 are included in this chapter with full descriptions. Additional courses, which were offered prior to 1993-94 and are likely to be taught in the future, are listed separately by number and title only under the heading Courses Currently Unscheduled. For courses which will be offered in 1995-96, consult the Official Schedule of Courses.

Introductory level courses are numbered below 100; advanced level courses are numbered 100 and above. Courses numbered 1 through 49 are primarily for first-year students; courses numbered from 200 through 299 are primarily for seniors and graduate students. (See the section on course load and eligibility in the chapter "Academic Procedures and Information.")

Odd-numbered courses are usually offered in the fall semester, even-numbered courses in the spring semester. Double numbers separated by a hyphen indicate that credit is contingent upon completion of both courses. Double numbers separated by a comma indicate that although the course is a year-long course, credit may be received for either course or both courses.

The following symbols, suffixed to course numbers, identify the small group learning experiences: *S*, seminar; *P*, preceptorial; *T*, tutorial; *D*, discussion section. The *L* suffix indicates that the course includes laboratory experience. *C-L*: denotes a course that is cross-listed or a program under which a course is listed.

The following symbols, suffixed to course titles, identify the area of knowledge to which a particular course has been assigned in the curriculum: *AL*, arts and literatures; *CZ*, civilizations; *FL*, foreign languages; *NS*, natural sciences; *QR*, quantitative reasoning; *SS*, social sciences.

The following portion of this bulletin, arranged alphabetically, includes courses of academic departments, programs, sections, and institutes, as well as categories of courses. Details are provided in the individual entries, which indicate whether a major, a minor, and a certificate is available in that particular field. (A certificate, offered in some programs, is not a substitute for a major but is a supplement, confirming that a student has satisfied the requirements of that program.)

Trinity College of Arts and Sciences

Professor White, *Dean of Trinity College and Vice-Provost for Undergraduate Education*; Senior Associate Dean for Administration Wilson (Social Sciences); Associate Deans Bryant (Social Sciences), Nijhout (Natural Sciences), Willard (Academic Planning and Special Programs), and Wittig (Humanities); Assistant Deans Johns (Study Abroad), Keul (Pre-Majors), Lattimore (Social Sciences), Ruderman (Summer Sessions), and Singer (Natural Sciences)

Aerospace Studies—Air Force ROTC (AS)

Professor Quillin, Colonel, USAF, *Chair*; Visiting Assistant Professor Henry-Hamilton, Captain, USAF, *Director of Undergraduate Studies*; Visiting Assistant Professors Culver, Captain, USAF, and Sims, Major, USAF

Eligibility Requirements. All freshmen and sophomores, men and women, are eligible to enroll in the General Military Course in the Air Force Reserve Officer Training Corps. For enrollment in the Professional Officer Course, the student must have completed successfully either the General Military Course and a four-week field training encampment or the six-week field training encampment; must execute a written agreement with the government to complete the Professional Officer Course; must be sworn into the enlisted reserve; and must agree to accept a commission in the U.S. Air Force Reserve upon graduation. In addition, each student must take at least one course in mathematical reasoning and English composition prior to graduation/commissioning. Students in the General Military Course and Professional Officer Course also will be required to attend one hour of leadership laboratory each week. All courses, except 2L, are open to all other students with consent of instructor.

General Military Courses

First Year

1. The Air Force Today. Development of aerospace power in the United States; mission, doctrine, and organization of the U.S. Air Force and its relationship to the other services within the Department of Defense. (May not be counted to satisfy graduation requirements.) Half course. *Quillin*

2L. Leadership Laboratory. Instruction in drill and ceremonies, wearing the uniform, giving commands, and other leadership activities. Mandatory for all Air Force ROTC cadets. Must be repeated each semester. Pass/fail grading only. No credit. *Culver*

Second Year

51. Development of Air Power. Growth and development of air power from dirigibles and balloons to the present, emphasizing evolution of concepts and doctrine governing air power employment in support of national objectives. (May not be counted to satisfy graduation requirements.) Half course. *Henry-Hamilton*

Professional Officer Courses

All students selected to continue aerospace studies pursue the following courses:

Third Year

105S. Aerospace Leadership and Management. An introduction to management fundamentals to include the knowledge base and process of managing. One course. *Sims*

106S. Aerospace Leadership and Management. Application of management fundamentals to duties as junior officers/executives to include principles of leadership. One course. *Sims*

Fourth Year

205S. National Security Forces in Contemporary American Society. The evolution of U.S. foreign policy and the environment in which national security policy is formulated. One course. *Culver*

206S. National Security Forces in Contemporary American Society. The role and function of the professional military officer in a democratic society, military law, and contemporary issues in the military. One course. *Culver*

COURSES CURRENTLY UNSCHEDULED

49S. First-Year Seminar

African and Afro-American Studies Program (AAS)

Professor Wright, *Director*

A major or a certificate is available in this program.

The program in African and Afro-American Studies provides students with an interdisciplinary approach to the field, within which they may focus on Africa, North America, or the Caribbean. The courses are essential components of a liberal arts education. Students may complete a major or a certificate in the program. Nine courses (including a prerequisite course entitled Introduction to African and Afro-American Experiences) are required for the major; five are required for the certificate. A Duke summer study program is available in Zimbabwe/Botswana sponsored by the Department of Political Science.

The African and Afro-American Studies courses are listed below. (Full descriptions of cross-listed courses may be found in the Bulletin course listings of the particular department or program cited in the cross-listing, for example, Music 74.) In addition, Swahili and Arabic language courses are taught in the Asian and African Languages and Literature Program, and other relevant language courses in the Department of Romance Studies. A half-credit course in African dance technique is offered in the Dance Program.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

51. Introduction to African and Afro-American Experiences. (CZ) A general interdisciplinary study providing a broad overview of: African origins and culture, the slave trade in both Africa and the Americas, the antebellum period in the Americas, the struggle for freedom by black people, and the post-1865 period. One course. *Staff*

74. Introduction to Jazz. (AL) See C-L: Music 74. One course. *Jeffrey*

100. Duke Summer Program: Zimbabwe/Botswana. (SS) See C-L: Political Science 100C; also C-L: Comparative Area Studies. Variable credit.

115. History of Africa. (CZ) See C-L: History 115; also C-L: Comparative Area Studies and Women's Studies. One course. *Ewald*

116. Race and Ethnic Relations. (SS) See C-L: Sociology 116. One course. *Jackson*

122. Culture and Politics in Africa. (CZ) See C-L: Cultural Anthropology 122; also C-L: Comparative Area Studies. One course. *Piot*

124S. Slave Society in Colonial Anglo-America: The West Indies, South Carolina, and Virginia. (CZ) See C-L: History 124S; also C-L: Comparative Area Studies. One course. *Gaspar*

127A. The Caribbean, 1492-1700. (CZ) See C-L: History 127A. One course. *Gaspar*

127B. The Caribbean in the Eighteenth Century. (CZ) Not open to students who have taken African and Afro-American Studies 127. See C-L: History 127B. One course. *Gaspar*

133. History of African-American Social Dance Forms of the Twentieth Century. (AL) See C-L: Dance 133. One course. *Sommer*

138. Francophone Literature. (AL, FL) Prerequisite: good knowledge of French. See C-L: French 168; also C-L: Asian and African Languages and Literature 168 and Comparative Area Studies. One course. *Mudimbe-Boyi*

- 141. Special Topics in Jazz. (AL)** Also taught as Music 141. Prerequisite: Music 74 or consent of instructor. One course. *Brothers or Jeffrey*
- 142. African-American Music in the Twentieth Century. (AL)** See C-L: Music 142. One course. *Brothers*
- 145A, 145B. Afro-American History. (CZ)** See C-L: History 145A, 145B. One course each. *Gavins*
- 149. Introduction to African-American Politics. (SS)** See C-L: Political Science 141. One course. *Orr*
- 152. African-American Religion, History, and Culture. (CZ)** See C-L: Religion 154. One course. *Hart*
- 153. From the African Kraal to the African-American Church. (CZ)** See C-L: Religion 153. One course. *Lincoln*
- 154. Art and Philosophy from West Africa to the Black Americas. (AL)** See C-L: Art 174; also C-L: Comparative Area Studies and Literature 125. One course. *Powell*
- 156. The Blues Aesthetic: Afro-American Art in the Twentieth Century. (AL)** See C-L: Art 176; also C-L: Literature 127. One course. *Powell*
- 157. Art, Architecture, and Masquerade in Africa. (AL)** See C-L: Art 173; also C-L: Comparative Area Studies. One course. *Powell*
- 161S. Economics of Slavery in the American South. (SS)** Prerequisite: Economics 149. See C-L: Economics 161S; also C-L: History 140S. One course. *Staff*
- 164. History and Religions of North Africa. (CZ)** See C-L: Religion 164; also C-L: Comparative Area Studies, History 187, and Interdisciplinary Course 164. One course. *Cornell*
- 168S. The Atlantic Slave Trade. (CZ)** See C-L: History 168S; also C-L: Comparative Area Studies. One course. *Gaspar*
- 169S. Afro-American Drama. (AL)** Also taught as English 169S. One course. *Hill*
- 170. Brazilian Race Relations in Comparative Perspective. (CZ)** See C-L: History 170C. One course. *French*
- 171. Politics of South African Apartheid (B). (SS)** See C-L: Political Science 171; also C-L: Comparative Area Studies. One course. *Johns*
- 173, 174. African American Literature. (AL)** See C-L: English 167, 168. One course each. *Chandler, Clarke, or Holloway*
- 175S. The Southern Plantation as Historical Laboratory: Odyssey in Black and White, 1770-1970. (CZ)** See C-L: History 175S. One course. *Nathans*
- 177. North African Literature in Translation. (AL)** See C-L: Asian and African Languages and Literature 174; also C-L: Comparative Area Studies. One course. *Chergui*
- 179. History of South Africa, 1600-1960. (CZ)** See C-L: History 179; also C-L: Comparative Area Studies. One course. *Ewald*
- 180. Writings in the Rural Tradition: From the Caribbean to the American South. (AL)** See C-L: Literature 180; also C-L: Comparative Area Studies and English 180. One course. *Willis*
- 195S. Fugitive Slave (Maroon) Communities in New World Slave Societies. (CZ)** Also taught as History 195S.40. C-L: Comparative Area Studies. One course. *Gaspar*

196S. Issues in the History of Tropical Africa. (SS) Also taught as History 195S.23. C-L: Comparative Area Studies. One course. *Ewald*

197S. The Destruction and Aftermath of Slavery in the Americas: A Comparative Perspective. (CZ) Also taught as History 195S.18. One course. *J. Scott*

198S. Senior Seminar. Open to seniors majoring in African and Afro-American Studies and to others with consent of instructor. One course. *Staff*

199S. Special Topics. Topics vary from semester to semester. One course. *Staff*

206. Origins of Afro-America. (CZ) See C-L: History 206. One course. *J. Scott*

233S. Slave Resistance and Social Control in New World Societies. (CZ) See C-L: History 233S; also C-L: Comparative Area Studies. One course. *Gaspar*

264S. Poverty and Social Policy: Life Course Human Resource Development. (SS) Also taught as Public Policy Studies 264S.46. One course. *Staff*

270S. Topics in African Art. (AL) Consent of instructor required. See C-L: Art 270S. One course. *Powell*

292S. Slavery and Freedom in Africa, to 1960. (CZ) See C-L: History 295S; also C-L: Comparative Area Studies. One course. *Ewald*

299. Special Topics. Topics vary from semester to semester. One course. *Staff*

299S. Special Topics. Seminar version of African and Afro-American Studies 299. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

103. North African Culture. (AL)

128. Writings in the Pan-African Tradition. (AL)

131S. Comparative Government and Politics: Africa. (SS)

155. Comparative Perspectives on Literature and Social Change: From Plantation to City. (AL)

176S. The Southern Plantation as Historical Laboratory: Research Seminar. (CZ)

261. Islam in the African-American Experience. (CZ)

THE MAJOR

Students may choose one of the two following options.

A. North American Focus

Prerequisite: African and Afro-American Studies 51.

Major Requirements:

1. Three courses—One focusing upon North America in *each* of the following areas:
 - a. Arts or Literature
 - b. History
 - c. Social, Religious, Economic, or Political Institutions/Processes.
2. African and Afro-American Studies 198S (Senior Seminar).
3. Four additional courses, preferably in, but not limited to, one of the areas noted in Item 1. One of these four courses must focus upon Africa or on the Caribbean/Latin America.

B. African/Caribbean Focus

Prerequisite: African and Afro-American Studies 51.

Corequisites: Four (4) semester courses, or equivalent competency, in a single foreign language appropriate to the primary focus (African or Caribbean): Arabic, French, Spanish, Portuguese, or Swahili.

Major Requirements:

1. Three courses—*One* focusing upon Africa or the Caribbean/Latin America in *each* of the following areas:
 - a. Arts or Literature
 - b. History
 - c. Social, Religious, Economic, or Political Institutions/Processes.
2. African and Afro-American Studies 198S (Senior Seminar).
3. Four additional courses, preferably in, but not limited to, one of the areas noted in Item 1. At least one of these four courses must focus upon Africa and at least one must focus upon Caribbean/Latin America.

THE CERTIFICATE

Students who are not majoring in African and Afro-American Studies may complete a certificate in the field by satisfactory completion of the following five courses:

1. African and Afro-American Studies 51.
2. Four additional courses in the program—one in each of the following areas:
 - a. Arts or Literature
 - b. History
 - c. Social, Religious, Economic, or Political Institutions/Processes.

N.B. One of these four courses must focus upon Africa or the Caribbean/Latin America.

Animal Behavior

For courses in animal behavior, see Biology.

Anthropology

See the Department of Biological Anthropology and Anatomy and the Department of Cultural Anthropology for information about those majors.

Arabic

For courses in Arabic, see Asian and African Languages and Literature.

Art and Art History (ART)

Associate Professor Wharton, *Chair*; Associate Professor Van Miegroet, *Director of Undergraduate Studies*; Professor Bruzelius; Associate Professors Powell and Pratt; Assistant Professors Abe, Cernuschi, Cornack, Rice, and Stiles; Professor Emeritus Markman; Associate Professor of the Practice Tronzo; Assistant Professors of the Practice Bregel, Noland, and Shatzman; Adjunct Associate Professor Reents-Budet

Majors in art history and visual arts are available in this department.

HISTORY OF ART

Art history is the study of works of art in the context of the broader social, political, and intellectual cultures of which they are a part. Studying art history develops the

ability to evaluate and organize information, visual as well as verbal; it also enhances the faculties of creative imagination, precise observation, clear expression, and critical judgment. Students of art history acquire a sophisticated understanding of the theory and practice of artistic production and reception.

A major or second major in art history provides basic training for those interested in art-historical or art teaching, museum and gallery work, art publishing, and advertising; the major also furnishes an appropriate background for graduate training in architecture. Art history's emphasis upon careful observation, the ordering of diverse sorts of information, expository writing, and scholarly research makes it a good general preparation for any profession.

20. Basic Art History. Credit for advanced placement on the basis of the College Board examination in Art History. Does not count toward the major in art history or design. One course.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50. Introduction to Spanish Art. (AL, FL) The history of art in Spain from prehistoric times to Picasso and other artists of the twentieth century. (Taught in Spanish in Spain.) One course. *Staff*

51. Art of the Baroque and Rococo. (AL, FL) Study of one of the most important monuments of European Art, the Baroque through its most representative painters, and the introduction of a new art arising in France: the Rococo. The history of the movement in the country of each painter as well as the different characteristics in each particular case. (Taught in Spanish in Spain.) One course. *Staff*

55. History of Spanish Art of the Nineteenth Century: Goya and His Times. (AL, FL) Goya's life in its historical and artistic context; Goya as a painter of the aristocracy; his personal crisis; the Napoleonic invasion of 1808 and its influence on Goya; and his last stage. (Taught in Spanish in Spain.) One course. *Staff*

69, 70. Introduction to the History of Art. (AL) The history of western architecture, sculpture, and painting in a cultural context. 69: from prehistory to the Renaissance (c. 1400). 70: from the Renaissance to the present. One course each. *Staff*

69D, 70D. Introduction to the History of Art. (AL) Same as Art 69, 70 except instruction provided in two lectures and one small discussion meeting each week. One course each. *Staff*

115. Ancient Greece. (CZ) Prerequisite: Classical Studies 11S, 53, 123, or 124, or History 53, or consent of instructor. See C-L: Classical Studies 147. One course. *Younger*

123. Greek Art and Archaeology I. (AL) See C-L: Classical Studies 123. One course. *Younger*

124. Greek Art and Archaeology II. (AL) See C-L: Classical Studies 124. One course. *Younger*

126A. Rome: History of the City. (CZ) Not open to students who have taken Art 126. See C-L: Classical Studies 145. One course. *Staff*

126B. Roman Architecture. (AL) Cities and major monuments of the Roman world. The architecture of Republican Italy (with reference to Hellenistic and Etruscan predecessors) and of the transition to the Empire. Public (state-sponsored) and private monuments (funerary monuments, domestic architecture). C-L: Classical Studies 144. One course. *Cormack*

128. Art of the Roman Empire. (AL) Art and architecture in the Roman world from Augustus to Theodosius. Emphasis on portraiture, private arts, and triumphal monu-

ments. Not open to students who have had Classical Studies 126. C-L: Classical Studies 128. One course. *Cormack*

129. The History of Prints and Printmaking. (AL) The art of printmaking from the fifteenth through the eighteenth centuries. The impact of the invention of printing; technical and artistic innovations; the contributions of individual artists from Mantegna to Tiepolo. Firsthand experience of basic printmaking techniques in the studio; study of original works of art on frequent trips to local museums and libraries. Consent of instructor required. C-L: Medieval and Renaissance Studies. One course. *Rice*

130. Late Antique Christian Art. (AL) Art and architecture of the Christian community from the third to the fifth century in the context of the Roman imperial state. C-L: Classical Studies 130 and Religion 130. One course. *Wharton*

131. Art of the Early Middle Ages. (AL) Survey of Early Christian, Byzantine, Carolingian, and Ottonian art and architecture. Focus on the impact of church and empire on the form and function of artworks from the third to eleventh centuries. C-L: Classical Studies 131 and Medieval and Renaissance Studies. One course. *Tronzo or Wharton*

134. Topics in Medieval Art and Architecture. (AL) Specific problems dealing with contextual and cultural issues in medieval art and architecture from c. 300 to 1400. C-L: Medieval and Renaissance Studies. One course. *Tronzo*

140. Topics in Renaissance Art. (AL) Specific problems dealing with the iconography, style, or an individual master from c. 1300 to 1600. Subject varies from year to year. C-L: Medieval and Renaissance Studies. One course. *Rice or Tronzo*

141. Fifteenth-Century Italian Art. (AL) Painting, sculpture, and architecture from Masaccio, Donatello, and Brunelleschi to Leonardo. Emphasis on the art of Florence. C-L: Medieval and Renaissance Studies. One course. *Rice*

142. Sixteenth-Century Italian Art. (AL) Painting and sculpture in Rome and Florence: Michelangelo, Raphael, Leonardo. The rise and diffusion of mannerism: Pontorno to Tintoretto. C-L: Medieval and Renaissance Studies. One course. *Rice*

145. Renaissance Art in Florence. (AL) Paintings, sculpture, and architecture from Giotto to Michelangelo based on the works of art preserved in Florence. Emphasis on individual artists and their creations and on the relation of the artists to the society of their times. (Taught in Italy.) C-L: Medieval and Renaissance Studies. One course. *Rice*

146. Italian Renaissance Architecture. (AL) Development of building types and city planning in the fifteenth and sixteenth centuries in central and northern Italy. Emphasis on Brunelleschi, Alberti, Bramante, Michelangelo, and Palladio. C-L: Medieval and Renaissance Studies. One course. *Rice*

147. Byzantine and Ottoman Art and Architecture in the City of Constantinople/Istanbul. (CZ) Change and continuity of art and architecture in the city of Constantinople/Istanbul from the Eastern Roman Empire during the early Christian era, through the Medieval period and the crusades to the Ottoman Empire. Taught on site in Turkey in summer. Prerequisite: sophomore standing. One course. *Staff*

148. Art of the Netherlands in the Fifteenth Century. (AL) Early Netherlandish painting in the Burgundian Netherlands from Hubrecht and Jan Van Eyck to Gerard David and Hieronymus Bosch. Cultural, historical, and intellectual environment in Flanders and Brabant; civic and courtly patronage in Doornik (Tournai), Ghent, Bruges, Mechlin, and Antwerp; new research strategies of contemporary evidence. C-L: Medieval and Renaissance Studies. One course. *Van Miegroet*

149. Aspects of Renaissance Culture. (CZ) See C-L: Medieval and Renaissance Studies 115; also C-L: History 148. One course. *Rasmussen, Van Miegroet, and Witt*

150. Italian Baroque Architecture. (AL) Architecture in Italy in the seventeenth and eighteenth centuries. Emphasis on the contributions of Bernini, Borromini, Cortona, Guarini, and Juvarra. The evolution of building types, both secular and religious; town planning; garden and landscape history. Special attention to the cultural, economic, and political forces that shaped the Baroque city. C-L: Medieval and Renaissance Studies. One course. *Rice*

151. Art of Italy in the Seventeenth Century. (AL) Caravaggio, the Carracci, Guido Reni, Domenichino, Bernini, and Poussin. Modes of description and narration; the concern with the status of pictorial representation; and the attempts to define and retrieve the canonical achievements of the early sixteenth century. One course. *Rice*

152. Art of the Netherlands in the Sixteenth Century. (AL) Painting in Antwerp and the Spanish Netherlands in a period of political turbulence (Reformation, Counter-Reformation); Pieter Bruegel, Frans Floris, Hendrick Goltzius; landscape painters and the exiles at Frankenthal; Flemish painters at the court of Rudolph II in Prague; art and politics in Flanders, Brabant, and Holland. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Van Miegroet*

153. Art of the Northern Netherlands in the Seventeenth Century. (AL) A contextual study of northern Netherlands art, seen through the major Dutch cities and towns where painters, such as Frans Hals and Johannes Vermeer, were at work. Rembrandt and his school; Dutch art in its historical, societal, moral, and psychological context. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Van Miegroet*

154. German Art in the Fifteenth and Sixteenth Centuries. (AL) An examination of German art, including Stefan Lochner, Konrad Witz, Albrecht Dürer, and Hans Holbein the Younger; the significance of the Councils of Konstanz and Basel; the revolutionary impact of the printing press. New trends in sculpture, including the relatively unknown wood carvings created in Nuremberg between 1475 and 1515. C-L: Comparative Area Studies, Interdisciplinary German Studies, and Medieval and Renaissance Studies. One course. *Van Miegroet*

155. Mercantile Culture and Art in the Netherlands. (CZ) The mercantile culture and its relationship with art and the occupation of artist in the Netherlands (fifteenth–seventeenth centuries). The economy of towns, the artist's social position, the place of art in the local economy, and the connections between economic well being and the emergence of art as asset. Commercial evolution: institutions (markets, banks, stock exchanges), instruments (for example, the bill of exchange), and attendant conditions (risk, speculations, panics). The peculiarities of picturing, the role of art as moveable product, liquidity and store of value. Prerequisites: Art 70 and consent of instructor. C-L: Comparative Area Studies and Economics 152. One course. *De Marchi and Van Miegroet*

157A-157B. Vietnamese Cultural Studies in Hanoi. (AL, SS) Social, political, and cultural history of Vietnam. Its art, literature, and music; geography, natural resources, and populations; ethnic minorities, religion; evolution of women's role in Vietnamese society; traditional village life and agriculture; economic policies during the period of political renovation (c. 1985-1990) and transition to a market economy; and international relations. Taught in the Summer Program in Vietnam. Two courses. *Stiles*

158-159. Art and Cultural History of Flanders and the Netherlands from the Fifteenth through the Seventeenth Centuries. (AL) A contextual interpretation of art and culture of the Greater Netherlands through intensive and immediate contact with the cultural legacy of major cities such as Ghent, Bruges, Leuven, Antwerp, and Brussels

in the south, and Haarlem, Leiden, Amsterdam, Delft, and Utrecht in the north. Visits to major museums, cathedrals, the atelier of Rubens; discussion of major painters such as Van Eyck, Bosch, Bruegel, Rembrandt, Hals, Vermeer, Jordeans, and Rubens. (Taught in Flanders and the Netherlands.) C-L: Comparative Area Studies. Two courses. *Van Miegroet*

161. Nineteenth-Century Art, 1789-1848: Revolution to Revolution. (AL) Painting and sculpture of leading artists within the movements of neoclassicism, romanticism, and mid-century realism. C-L: Comparative Area Studies. One course. *Cernuschi*

162. American Art from Colonial Times to 1900. (AL) The development of an American national school in portraiture, history painting, landscape, genre scenes, and still-life. Major figures include Copley, Bingham, Cole, Church, Whistler, and Eakins. One course. *Powell*

163. Twentieth-Century American Art: Identity and Nationalism. (AL) Survey of twentieth-century American art from 1900 to the present, including major stylistic and theoretical developments and movements (that is, the Harlem Renaissance, the "American Scene," and others). Special attention to artistic activities emanating from such government-sponsored programs as the Works Progress Administration's Federal Art Projects, the Farm Security Administration's Photography Units, and the National Endowment for the Arts' various programs. C-L: Literature 163. One course. *Powell*

164. Early Chinese Art and Archaeology. (AL) Chinese art from earliest times through the third century C.E., primarily ceramics, bronze vessels, sculpture, and painting from mortuary contexts. C-L: Comparative Area Studies. One course. *Abe*

166. Nineteenth-Century Art after 1848: Early Modernism. (AL) A survey of the second half of the nineteenth century in Europe with particular emphasis on realism, impressionism, post-impressionism, and symbolism. One course. *Cernuschi or Stiles*

167. Twentieth-Century Art, 1900-1945: The Avant-garde and Modernism. (AL) Major artistic movements and theoretical aims of early modernism: fauvism, cubism, expressionism, futurism, constructivism, suprematism, dada, surrealism, deStijl, Bauhaus, and Neue Sachlichkeit. C-L: Comparative Area Studies, Literature 167, and Women's Studies. One course. *Cernuschi or Stiles*

168. Art since 1945: Modernism and Postmodernism. (AL) Major artistic movements and theory in Europe and the United States after World War II: abstract expressionism, color field, pop art, minimal art, Arte Povera, process, conceptual, and performance art, earthworks, photo-realism, neo-expressionism, and appropriation. C-L: Comparative Area Studies, Literature 168, and Women's Studies. One course. *Cernuschi or Stiles*

169. Documentary Photography and Social Activism in the Nuclear Age. (AL) The role of photojournalism and documentary photographers in recording and communicating vital issues of the nuclear age including nuclear weapons testing and its effects, the environmental issues surrounding fallout and nuclear power-plant accidents, low-level waste disposal, and other human and environmental issues related to war, the technology of nuclear weapon and energy production and their cultural manifestations. Not open to students who have taken Art 177B. C-L: Comparative Area Studies and Literature 172. One course. *Stiles*

170. Chinese Buddhist Art and Architecture. (AL) Chinese sculpture, painting, and architecture in relation to Buddhist texts, practice, and ritual from the fourth through the ninth century C.E. Introduction to precedents in Indian and Central Asian Buddhist art. Emphasis on overall contexts and programs. C-L: Comparative Area Studies. One course. *Abe*

171. Chinese Painting. (AL) A critical survey of painting in China from the second through the fourteenth century C.E. C-L: Comparative Area Studies. One course. *Abe*

172. Topics in Oriental Art. (AL) A critical survey of Chinese, Korean, and Japanese art from the earliest times to the nineteenth century. C-L: Comparative Area Studies. One course. *Abe*

173. Art, Architecture, and Masquerade in Africa. (AL) Major art forms, monuments, vernacular structures, and masking traditions in West, Central, and Southern Africa. From ancient times to the present. C-L: African and Afro-American Studies 157 and Comparative Area Studies. One course. *Powell*

174. Art and Philosophy from West Africa to the Black Americas. (AL) A survey of several major cultural groups in West Africa and their impact on the arts and religions of blacks in South America, the Caribbean, and the United States. C-L: African and Afro-American Studies 154, Comparative Area Studies, and Literature 125. One course. *Powell*

175. Art and Material Culture of the Southern United States. (AL) A survey of art that was created in the southern United States and made by artists from the South. Special attention given to material culture, vernacular art forms, site-specific creations, and work that addresses the idea of a regional identity. C-L: Literature 126. One course. *Powell*

176. The Blues Aesthetic: Afro-American Art in the Twentieth Century. (AL) Art of the twentieth century, with an emphasis on works derived from an Afro-United States cultural perspective. Major figures include Aaron Douglas, Jacob Lawrence, Charles White, Elizabeth Catlett, and Romare Bearden. C-L: African and Afro-American Studies 156 and Literature 127. One course. *Powell*

179. The History of Performance Art. (AL) Works in the visual arts in which the primary means and medium of expression is the human body in happenings, Fluxus, demonstrations, destruction art, body art, and performance since 1955. Theoretical discussion focusing on the challenge that live art poses to the traditional paradigm of the art object. C-L: Comparative Area Studies, Drama 179, Literature 176, and Women's Studies. One course. *Stiles*

181. The New York School: Art of the 1940s and 1950s. (AL) American art after World War II: abstract expressionism and the New York School. Emphasis on gestural painting (Pollock, de Kooning, Kline) and color field (Rothko, Newman, Gottlieb) with particular attention to issues of criticism and interpretation. One course. *Cernuschi*

182. The Concept of Expressionism. (AL) Expressionism in modern art with emphasis on early twentieth-century examples in Scandinavia, Austria, and Germany, abstract expressionism in New York, and recent manifestations of neo-expressionism associated with the postmodern. Emphasis on Munch, Schiele, Kirchner, Nolde, Pollock, de Kooning, Schnabel, Rainer, Baselitz, and Kiefer. One course. *Cernuschi*

184. History of Impressionism. (AL) The evolution of the impressionist movement and post-impressionist reactions of the 1880s. Particular attention to the work of Manet, Degas, Monet, Renoir, and Pissarro. C-L: Comparative Area Studies. One course. *Cernuschi*

187. Surrealism. (AL) The origins, aims, literature, and politics of the international movement of surrealism, which flourished between the world wars, examined in the context of surrealist theory. The psychoanalytic and metaphysical sources of surrealist poetry and visual representations as reflecting a utopian ideology of liberation. C-L: Comparative Area Studies and Women's Studies. One course. *Stiles*

188. Twentieth-Century Modernist and Postmodernist Criticism. (AL) A survey of the writings of artists, critics, and art historians from the late nineteenth century to the present, concentrating on major critical debates and on the interplay of various methodologies including formalist, iconographic, Marxist, feminist, psychoanalytic, structuralist, and poststructuralist in the interpretation of twentieth-century art. C-L: Literature 188. One course. *Cernuschi or Stiles*

189. Modern and Postmodern Architecture. (AL) The history of architecture from nineteenth-century Beaux-Arts classicism through Art Nouveau and the modern movement to postmodernism. Political and ideological as well as the formal and technical aspects of building investigated through primary texts. C-L: Literature 189. One course. *Wharton*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of director of undergraduate studies. One course each. *Staff*

193. Art and Culture of Mesoamerica. (AL) The art of pre-Columbian Mesoamerica (Mexico, Guatemala, Belize, and Honduras) from the beginnings of permanent settlements through the coming of the Spaniards (2000 B.C.-1519 A.D.). The Olmec, Teotihuacan, Zapotec, Maya, Mixtec, and Aztec cultures, including the numerous indigenous writing systems, studied in order to understand sociopolitical and religious institutions. C-L: Comparative Area Studies. One course. *Reents-Budet*

194. Maya Art and Culture. (AL) The ancient Maya civilization of Mexico, Guatemala, and Belize explored through study of their material culture. Mayan religious and political iconography in conjunction with Mayan hieroglyphic writing. Approaches include those of archaeology, ethnohistory, and linguistics. C-L: Comparative Area Studies. One course. *Reents-Budet*

195. Pre-Columbian Art and Culture of Andean South America. (AL) The art of Peru, Bolivia, Ecuador, and Colombia from the beginnings of permanent settlements through the coming of the Spaniards (1534 A.D.), concentrating on sociopolitical and religious institutions. C-L: Comparative Area Studies. One course. *Reents-Budet*

For Seniors and Graduates

201S. Topics in Greek Art. (AL) Specific aspects of the art or architecture in the Greek world from the late Geometric to the Hellenistic periods. Subject varies from year to year. Consent of instructor required. C-L: Classical Studies 220S. One course. *Cormack*

202S. Topics in Roman Art. (AL) Selected topics in the art and architecture of late republican and imperial Rome. Subject varies from year to year. Consent of instructor required. C-L: Classical Studies 227S. One course. *Cormack*

216. The Art of the Counter Reformation. (AL) Religious art in Catholic Europe during and following the Council of Trent. Issues such as the rise of the new religious orders; the revival of interest in the early Church and the origins of Christian archaeology; the Church's use of art in its war against Protestantism. Considers the validity of the concept of a counter-reformation style. C-L: Medieval and Renaissance Studies. One course. *Rice*

233S. Topics in Early Christian and Byzantine Art. (AL) Specific conceptual, institutional, or formal problems in the art of the late antique world or of the east Roman Empire. Subject varies from year to year. Consent of instructor required. C-L: Classical Studies 230S, Medieval and Renaissance Studies, and Religion 275S. One course. *Wharton*

236S. Topics in Romanesque and Gothic Art and Architecture. (AL) Analysis of an individual topic. Subject varies from year to year. Consent of instructor required. C-L: Medieval and Renaissance Studies. One course. *Bruzelius or Tronzo*

237S. Greek Painting. (AL) See C-L: Classical Studies 232S. One course. *Stanley*

238S. Greek Sculpture. (AL) See C-L: Classical Studies 231S. One course. *Younger*

243S. Topics in Netherlandish and German Art. (AL) Specific problems in northern Renaissance or baroque art such as the Antwerp workshops of the sixteenth century or a critical introduction to major artists such as Van Eyck, Bosch, Dürer, and Rubens. An analytical approach to their lives, methods, atelier procedures and followers; drawings and connoisseurship problems; cultural, literary, social, and economic context; documentary and scientific research strategies. Subject varies from year to year. Consent of instructor required. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Van Miegroet*

244A, S. International Expressionism. (AL) A synchronic view of the expressionist revolution in modern aesthetic conceptions throughout Europe in the period 1905-1925, emphasizing fusions of established aesthetic modes with new technological media, and the opening up of the Western tradition to other cultures, especially African. German expressionism forms the nucleus of the course and its study is integrated with the theory and practice of Italian futurism, Anglo-American imagism and vorticism, French surrealism, and Russian rayonnism. Not open to students who have taken Art 244S or German 244S. C-L: German 244A. One course. *Cernuschi and Rolleston*

244B, S. International Modernism. (AL) An interdisciplinary view of the various aesthetic and literary manifestations of European modernism: cubism, imagism, futurism, vorticism, suprematism, constructivism, dadaism, expressionism, and surrealism. C-L: German 244B. One course. *Cernuschi and Rolleston*

247S. Topics in Italian Renaissance Art. (AL) Specific problems dealing with iconography, style, or an individual master from c. 1300 to 1600. Subject varies from year to year. Consent of instructor required. C-L: Medieval and Renaissance Studies. One course. *Rice*

257S. Topics in Pre-Columbian Art and Culture. (AL) Selected topics in pre-Columbian art and archaeology with an emphasis on the political and cultural context of the artifact. Subject varies from year to year. Consent of instructor required. C-L: Comparative Area Studies. One course. *Reents-Budet*

260S. Topics in Italian Baroque Art. (AL) Problems in Italian art and architecture from c. 1580 to c. 1750. Topics vary from year to year. Consent of instructor required. C-L: Medieval and Renaissance Studies. One course. *Rice*

265S. Topics in Nineteenth-Century Art. (AL) Focus on a major artist, movement, or trend in nineteenth-century art. Subject varies from year to year. Consent of instructor required. One course. *Cernuschi or Stiles*

270S. Topics in African Art. (AL) Specific problems of iconography, style, or a particular art tradition. Subject varies from year to year. Consent of instructor required. C-L: African and Afro-American Studies 270S. One course. *Powell*

271S. Topics in Art of the United States. (AL) Selected topics from colonial times to 1945, with emphasis on major cultural issues, movements, works, and/or artists. Consent of instructor required. One course. *Powell or Stiles*

272S. Topics in Chinese Art. (AL) Problems and issues in a specific period or genre of Chinese art. Specific focus varies from year to year. C-L: Comparative Area Studies. One course. *Abe*

283S. Topics in Modern Art. (AL) Selected themes in modern art before 1945, with emphasis on major movements or masters. Subject varies from year to year. Consent of instructor required. C-L: Comparative Area Studies. One course. *Cernuschi or Stiles*

291, 292. Independent Study/Special Problems in Art History. Directed reading and research. Consent of instructor required. One course each. *Staff*

296S. Methodology of Art History. (AL) Approaches to the study and theory of art: historiography, connoisseurship, iconology, and criticism. Consent of instructor required. One course. *Staff*

297S. Topics in Art since 1945. (AL) Historical and critical principles applied to present-day artists and/or movements in all media since World War II. Consent of instructor required. C-L: Comparative Area Studies. One course. *Cernuschi or Stiles*

298S. Topics in Modern and Postmodern Architecture. (AL) The study of particular architects, movements, or building genres in their conceptual and political contexts. Subject varies from year to year. Consent of instructor required. C-L: Comparative Area Studies. One course. *Wharton*

299S. Critical Theory. (AL) Understanding of the visual arts in terms of the theoretical developments in other disciplines (for example, literature, women's studies, Marxism, and anthropology). Focus on the writings of theory-centered art historians and critics. Consent of instructor required. One course. *Cernuschi, Stiles, or Wharton*

VISUAL ARTS

Studio art courses offer directed experiences in the practice of the visual arts, enhancing the understanding of art both within the history of culture and as an individual human achievement. Department offerings emphasize the analysis and articulation of visual concepts and processes as they relate to a broader education in the humanities and sciences.

A major or concentration in studio art can provide the foundation for further study in various areas of the visual arts. It may prepare the student for further training as an artist, teacher, or architect, as well as in related fields such as advertising or design. Lower-level courses emphasize the fundamentals of drawing, color, and form; upper-level courses encourage the student to develop a more individual conceptual approach and style, within the context of historical precedents and traditions.

21. General Art, Studio. (AL) Credit for advanced placement on the basis of the College Board examination in Studio Art. Does not count toward the major in design. One course.

53. Drawing. (AL) Directed approaches to practice in life drawing and in the expression of graphic concepts. Consent of instructor required. One course. *Staff*

54. Two-Dimensional Design and Color. (AL) Experiments in form and color, with work from observation. Introduction to color theory in various media. Prerequisite: Art 53. One course. *Bregel or Pratt*

56. Sculpture. (AL) Introduction to the principles and processes of sculpture. Consent of instructor required. One course. *Noland*

101. Book Illustration. (AL) Each student will design and illustrate a story, journal, or grouping of poems. Projects will develop from initial sketches, to maquettes, and finally to the form of a bound book. Prerequisites: Art 53 and consent of instructor. One course. *Shatzman*

102. Figure Drawing. (AL) The human figure through different artistic media and visual concepts. Prerequisites: Art 53 and 54, and consent of the instructor based on portfolio. One course. *Staff*

103, 104. Painting. (AL) Studio practice in painting with individual and group criticism and discussion of important historic or contemporary ideas. Prerequisites: Art 54 or equivalent and consent of instructor. One course each. *Pratt*

105, 106. Advanced Drawing and Color. (AL) Work from life or in formal modes, with emphasis on personal development, through individual and group criticism and discussion. Prerequisites: Art 53 and 54 and consent of instructor. One course each. *Pratt*

107. Printmaking: Silkscreen. (AL) Studio course on the silkscreen medium and its stencil-making process including paper, film, blockouts, crayon, and photographic methods. Prerequisites: Art 53, 54 and consent of instructor. One course. *Shatzman*

108. Printmaking: Lithography. (AL) Introductory course on stone lithography and its drawing and printing techniques. Includes both black and white and color printing. Prerequisites: Art 53, 54 and consent of instructor. One course. *Shatzman*

109. Printmaking: Relief and Monotype. (AL) Studio course focusing on the relief methods of woodcut and linoleum block printing and monotype techniques. Concentration on the technical and historical aspects of the media at hand as well as visual and conceptual concerns. Prerequisites: Art 53, 54 and consent of instructor. One course. *Shatzman*

110. Intermediate Sculpture. (AL) Studio practice in sculpture at the intermediate level. Group and individual discussion and critique. Prerequisite: Art 56 or consent of instructor. One course. *Noland*

111. Advanced Sculpture. (AL) Studio practice in sculpture at the advanced level. Group and individual discussion and critique. Not open to students who have taken Art 111A. Prerequisites: Art 56 and 110, or consent of instructor. One course. *Noland*

112. Ceramics. (AL) Studio practice in the fundamentals of ceramics. Incorporates handbuilding techniques and sculpture in clay with emphasis on figurative and architectural forms. Wheel and throwing techniques. Group and individual criticism. Experimentation with range of surfaces and glazes. Study of both historical and contemporary ceramics. Consent of instructor required. One course. *Staff*

113. Printmaking: Intaglio. (AL) Studio course on directed problems in the intaglio medium including etching, aquatint, drypoint, black and white and color printing methods. Prerequisites: Art 53, 54 and consent of instructor. One course. *Shatzman*

118S. American Communities: A Photographic Approach. (SS) Consent of instructor required. See C-L: Public Policy Studies 176S; also C-L: Film and Video. One course. *Harris or Sartor*

119S. Advanced Documentary Photography. (SS) Prerequisite: Art 118S, Public Policy Studies 176S, or consent of instructor. See C-L: Public Policy Studies 177S. One course. *Harris*

120. Public Art and Private Concerns. (AL) Investigation of historical and contemporary examples of public art, its definitions, purposes, and precedents. Public art seen against artistic intention and public reaction. Field trips to area installations; visits by artists and administrators in the field. Not open to students who have taken Art 111B. One course. *Pratt*

133. Architectural Ceramics. (AL) Introduction to historical and contemporary ceramic tile, posing the questions of meaning and use as architectural symbol and

ornament. Selected cultural approaches; studio techniques of ceramic production; color/pattern/form considerations of tile murals. Students and instructor will create a mural. One course. *Esser*

165. Photography. (AL) The history of photography from its origins in the mid-nineteenth century, through the innovations in the 1930s that brought into use smaller, faster, and more discrete cameras, to the instant and ubiquitous presence it currently enjoys. Theoretical and historical readings complemented by the taking and processing of photographs. An exhibition of class work to be held at the end of the semester. Prerequisite: access to camera. C-L: Film and Video. One course. *Noland*

180S. Theory of Design. (AL) Visual thinking and innovations in historical and contemporary art. Formal analysis and discussion of important issues for students involved in creating art. Prerequisites: two courses in design and consent of instructor. One course. *Pratt*

203, 204. Advanced Painting. (AL) Prerequisites: Art 103, 104 and consent of instructor. One course each. *Pratt*

207, 208. Advanced Projects in Printmaking. (AL) Opportunity to work in the area(s) of choice. Emphasis on the visual and conceptual development through experimentation and practice in printmaking. Prerequisites: Art 53, 54, 107, 108, and consent of instructor. One course each. *Shatzman*

217, 218. Individual Project. (AL) Independent work open to highly qualified juniors and seniors on recommendation of instructor and invitation of department. One course each. *Staff*

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

100. Art and Architecture of Vienna. (AL)

114. The Aegean Bronze Age. (CZ)

116S. Athens. (CZ)

117. Pompeii. (CZ)

132. Art of the Late Middle Ages. (AL)

137. Roman and Non-Roman in Ancient Italy. (CZ)

143. Classical Tradition in the Renaissance. (CZ)

156. Art of the Southern Netherlands in the Seventeenth Century. (AL)

177. The History of Conceptual Art. (AL)

178. Pre-Columbian Art and Architecture. (AL)

180. The Interpretation of Abstraction. (AL)

186. Feminism in Twentieth-Century Art. (AL)

205S. Greek Architecture. (AL)

206S. Roman Architecture. (AL)

227S. Roman Painting. (AL)

THE MAJOR

The student will elect a sequence of courses emphasizing either the history of art or visual art. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

History of Art

Major Requirements. The major in art history requires at least eight courses. Both Art 69 and 70 are required. The other six courses should be distributed across the fields of ancient, medieval, Renaissance/baroque, modern, and non-Western (pre-Columbian, African, Oriental). Students must, in any case, take at least one course in four of these five areas. No fewer than one of these eight courses must also be a 200-level seminar. Two years of college-level study or the equivalent in French, German, or Italian are strongly recommended. Majors contemplating graduate work in history of art are advised to take more than eight courses in history of art and to gain competence in French and German. It is suggested that students who are interested in preparing for graduate work in architecture supplement their major requirements in the history of art and architecture with the following courses: Mathematics 31, 32 and either Mathematics 103 or Physics 51L, 52L; Art 53 and either Art 54 or 56; Institute of the Arts/Biology 45S; Engineering 75L or 83L.

Visual Arts

Corequisites. Art 69 or 70 and one other art history course.

Major Requirements. Art 53, 54, and five additional upper-level courses, one of which must be in each of three primary areas: painting, printmaking, and sculpture. Visual arts majors are strongly encouraged to take an independent study and to arrange a solo or group campus exhibition of the resulting work during their senior year.

DOUBLE MAJOR IN ART HISTORY AND VISUAL ARTS

Major Requirements. Students who wish to have a double major in art history and visual arts must take a total of thirteen courses in the department, as follows. In art history, the student must take Art 69 or 70, and five courses at the 100-level or above, including at least one 200-level seminar. These five courses must be distributed over four of the following five areas: ancient, medieval, Renaissance/Baroque, modern, and non-Western. In visual arts, the student must take Art 53 and 54 or 56 as well as at least five courses at the 100-level.

Institute of the Arts (AI)

A certificate, but not a major, is available in this program.

The Institute of the Arts administers an undergraduate certificate program in the arts, provides advisors for interdepartmental concentrations in the arts and assists students in designing individualized courses of study, offers interdisciplinary courses, sponsors artist residencies, coordinates and promotes activities in the creative and performing arts, and works to expand the role of the artist in a liberal arts setting. Courses, festivals, and events sponsored by the institute bring together faculty and students in different art forms to encourage an interdisciplinary perspective. A fall-semester off-campus residency program, the Duke in New York Arts Program, provides academic and professional experiences for selected juniors and seniors. For further information about the institute, inquire in 109 Bivins Building.

DUKE IN NEW YORK ARTS PROGRAM

The institute-sponsored Duke in New York Arts Program offers an intensive, off-campus experience for a select group of juniors and seniors. The program has four

components, each earning one credit: two seminars, an arts internship, and a course at New York University. The Duke courses are described below under institute courses. For information on admission to this program, contact the Institute of the Arts.

INSTITUTE OF THE ARTS (AI)

101S. Arts Resources in New York. (AL) Investigation of a central theme through attendance at selected art events in the New York area supplemented by discussions, critical papers, and reports. Visiting Duke faculty members and New York practitioners in the arts provide guest lectures and lead discussions. Open only to those admitted to the Duke in New York Arts Program. One course. *Staff*

102. Arts Internship in New York. Immersion in the professional art world through apprenticeship to a sponsoring artist, scholar, or organization chosen to match each student's area of interest and expertise. Offered only on the pass/fail basis and open only to students admitted to the Duke in New York Arts Program. One course. *Staff*

103S. Arts Production, Promotion, and Presentation in New York. Analysis and investigation of the processes by which representative arts events and endeavors in New York are conceived, developed, produced, promoted, performed, and evaluated. Guest lectures by practitioners in these processes. Open only to students admitted to the Duke in New York Arts Program. One course. *Staff*

122. The Arts in Contemporary Culture. (AL) The arts as a form of cultural practice, locating them in their sociopolitical context. The relationship between aesthetic history and cultural history. Questions about spectatorship, gender, race, and social class as they relate to the production, performance, perception, and criticism of the arts. Attendance at performances, exhibitions, and presentations. One course. *Staff*

150. Managing the Arts. Various aspects of planning, organization, promotion, resource development, and general operations of such typical arts organizations as arts councils, museums and galleries, subscription series, orchestras, and dance and theatre companies. Private, public, and governmental support for the arts. Not open to freshmen. One course. *Silbiger*

151S. Art and Its Making. (AL) An inquiry into artistic process from a conceptual survey of dominant views to direct interviewing of and discussion with artists. Not open to freshmen. One course. *Staff*

180, 181. Special Topics. (AL) Subjects associated with visiting artists-in-residence in the institute. Discussions and lectures conducted by guest artists on aspects of their work, views of the arts, associations with other disciplines. Previous topics have included "George Balanchine and Contemporary Ballet" and "Aspects of Broadway Bound." Topics announced each semester. Half course, one course, respectively. Variable credit. *Staff*

191, 192. Independent Study. Directed reading and research. Consent of instructor required. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

130. Inter-Arts: Theory and Practice. (AL)

ARTIST-IN-RESIDENCE PROGRAM

The Nancy Hanks Artist Residency Program brings distinguished artists to Duke to interact with students, faculty, and the community at large, in settings as diverse as formal courses, class visits, performances and exhibitions, informal workshops and seminars, and off-campus programs. Courses by Nancy Hanks Resident Artists and by

other visiting artists in the institute may not be listed in the bulletin since they vary from year to year. Consult the current course schedule and the institute for information about courses by artists in residence.

Asian and African Languages and Literature (AAL)

Associate Professor Wang, *Director*; Associate Professor of the Practice Khanna, *Director of Undergraduate Studies*; Professor Cooke; Assistant Professor Ching; Assistant Professors of the Practice Cornell, Endo, and Yao; Lecturer Zakim; Instructor Park Han. Affiliated faculty: Professors Mudimbe-Boyi (Romance studies), Lawrence (religion), and O'Barr (cultural anthropology)

A certificate, but not a major, is available in this program.

Asian and African Languages and Literature provides instruction in several languages and literatures of Asia and Africa. Languages offered are Arabic, Chinese, Hebrew, Hindi, Japanese, Korean, Persian, and Swahili. The program offers Arabic, Chinese, Hebrew, Hindi, and Japanese literature courses, many in translation. Its courses are particularly compatible with a major in Comparative Area Studies and the Literature Program.

To earn the certificate in Asian and African Languages and Literature students must take two years of introductory and intermediate language instruction and five other courses, consisting of the core course, Asian and African Languages and Literature 121 (Introduction to Asian and African Literature); two language courses at the third-year level (125, 126); a 100-level related literature or culture course; and one course in a related Asian or African language or literature.

ASIAN AND AFRICAN LANGUAGES AND LITERATURE (AAL)

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

72. War, Gender, and Postcoloniality. (AL) Covers selected wars in the twentieth century by examining the intersections between the experience of war and the ways in which men and women represent themselves. Focus on World Wars I and II, Vietnam, the Algerian Revolution, the Lebanese Civil War, and the Gulf War. One course. *Cooke*

121. Introduction to Asian and African Literature. (AL) An exploration of the ways in which different societies in Asia and Africa encourage particular constructions of self, sexuality, and purposeful life in literature and film. C-L: Comparative Area Studies and Literature 121. One course. *Staff*

137. Contemporary Culture in South Asia. (CZ) Everyday life in Indian cities and villages as represented in popular and intellectual media. Perspectives on cinema, television, and radio along with more traditional media. The fiction of Mohan Rakesh, the poetry of Muktibodh, the cinema of Aravindan and Satyajit Ray, the great Indian epics on Indian television. Taught in English. C-L: Comparative Area Studies and Literature 137. One course. *Khanna*

138. The Media in Modern India. (CZ) The influence of modern media on Indian society. Topics include: traditional sources of new knowledge; the role of print media during colonization and in the postcolonial period; the emergence of radio; contemporary use of film and television. (Taught in summer program in Bombay.) One course. *Khanna*

141S. The Fantastic in Chinese Fiction in Translation. (AL) A survey of Chinese narrative convention with special emphasis on the genre of the fantastic in premodern fiction. Topics include the influence of Chinese literary conventions and religious modes on the fantastic in tales and full-length novels. C-L: Comparative Area Studies. One course. *Wang*

148S. Literature and Revolution: From the May Fourth to the Post-Mao Era. (AL) The cultural politics of Chinese writer-intellectuals from the May Fourth period, through Mao Zedong's Yen'an era, up to the 1980s. Chiefly modern and contemporary narrative fiction and films. C-L: Comparative Area Studies and Literature 148S. One course. *Wang*

160, 161. Introduction to the Civilizations of Southern Asia. (CZ) See C-L: Interdisciplinary Course 101, 102; also C-L: Comparative Area Studies; Cultural Anthropology 101, 102; History 193, 194; and Religion 160, 161. One course each. *Khanma or staff*

162. Modern Japanese Fiction in Translation. (AL) An examination of the major forms of long and short fiction from 1880 to the present and of the tradition from which they arose. Not open to students who have taken Japanese 161. C-L: Comparative Area Studies. One course. *Ching*

165S. Modern Arabic Literature in Translation. (AL) Novels and short fiction from Egypt, Lebanon, Sudan, Iraq, Palestine, North Africa, and the Arabian peninsula. Texts raise issues of identity formation in postcolonial societies, gender construction, and representation of conflict. Not open to students who have taken Arabic 171S. C-L: Comparative Area Studies. One course. *Staff*

167. Asian Art and Theater. (AL) See C-L: Drama 167. One course. *Ma*

168. Francophone Literature. (AL, FL) Prerequisite: good knowledge of French. See C-L: French 168; also C-L: African and Afro-American Studies 138 and Comparative Area Studies. One course. *Mudimbe-Boyi*

170. The *I Ching*, or *Book of Changes*. (CZ) Its place in ancient Chinese religion and systematic thought; its contributions to Chinese and world culture. C-L: Comparative Area Studies. One course. *Staff*

171. Women and Creativity. (AL) Novels and short fiction from Egypt, Lebanon, Sudan, Iraq, Palestine, North Africa, and the Arabian Peninsula. Texts raising issues of identity formation in postcolonial societies, gender construction, and representation of conflict. C-L: Women's Studies. One course. *Hetata and Saadawi*

172S. South Asia in Poetry. (AL) Poetry from the Rig-Veda to contemporary times used as a mirror of, and approach to, religion, culture, and history of the region. Including Hindu traditional and mystical, Muslim medieval, early modern. No prior knowledge of foreign languages or South Asian culture required. One course. *Staff*

173S. Women in Arab Literature. (AL) Comparative readings of major Arabophone and Francophone women's writings from the nineteenth century until today, including al-Saadawi, al-Shaikh, Andree Chedid, and Djébar. Taught in English. C-L: Literature 142S and Women's Studies. One course. *Cooke*

174. North African Literature in Translation. (AL) Postcolonial literature of North Africa, namely Morocco, Algeria, and Tunisia. Particular attention paid to the ways various writers have voiced issues of identity resulting from the conflictual co-existence of national and colonial culture. C-L: African and Afro-American Studies 177 and Comparative Area Studies. One course. *Chergui*

181. Chinese Poetry and Prose in Translation. (AL) A chronological survey from earliest times to the end of the last century. Begins with a brief introduction to Chinese language and history insofar as they pertain to the study of literature. Essays, letters, classics, and various genres of poetry. Traditional Chinese literary criticism and bibliographical schemes. No knowledge of Chinese language required, although a number of poems will be examined in transcription with word-for-word translations. One course. *Staff*

182S. The Forbidden Books: Issues of Censorship in China. (AL) Topics include the tradition of book burning in premodern China, state ideology, religious prosecution and censorship, the problem of pornography, sexuality, and the emergence of the counter-Neo-Confucianist category of *qing* ("feelings/emotions") in the sixteenth century, the Literary Inquisition of the Qing dynasty, institutionalized censorship in Mao's era, and cultural policies in post-Mao China. C-L: Comparative Area Studies and Literature 182S. One course. *Wang*

183S. Modern Hebrew Literature in English Translation. (AL) Topics in the critical study of Hebrew literature and Israeli culture. Emphasis on developing analytical skills within a broad range of critical theories. Close readings of cultural production tied to theoretical inquiries of nationalism, marginality, ideology, each year concentrating on a particular set of theoretical issues. C-L: Judaic Studies. One course. *Zakim*

188. The Politics of Women's Liberation in the Arab World. (CZ) A multidisciplinary study combining the sexual with the political, religion with history, economics with culture, women's health with ethics. Specific characteristics, tendencies; relations with the state and political parties; interests it shares with women in the South and North. The changes in the situation of Arab women resulting from the new world order. C-L: Women's Studies. One course. *Hetata and Saadawi*

190. Women in Islam. (CZ) The forces influencing the lives of Muslim women from the seventh to the twentieth century. Geographical or historical focus may change. Themes to include: imperialism and resistance, family, religion, literature. C-L: Comparative Area Studies, Religion 139, and Women's Studies. One course. *Cooke*

191. Independent Study. Consent of instructor and director of undergraduate studies required. One course. *Staff*

195. Women in the Middle East. (CZ) The varied forces influencing the lives of women in the Middle East from the beginnings of Islam until the present. A broad introduction to the recent history of the Middle East. C-L: Comparative Area Studies and Women's Studies. One course. *Cooke*

196S. Special Topics in Advanced Film, Video, or Audio Production. (AL) Topics will vary each semester. One course. *Staff*

197S. Studies in Asian and African Literature. Topics vary each semester. One course. *Staff*

199. Asian and African Languages and Literature Honors Seminar. Open to seniors completing the certificate in Asian and African Languages and Literature (Arabic, Chinese, Hebrew, Hindi, Japanese, Korean, Persian, Swahili). Consent of instructor required. One course. *Staff*

252. Special Topics in Asian and African Literatures. (AL) Topics vary each semester. One course. *Staff*

Courses Currently Unscheduled

107. Comparative Orthography. (CZ)

164. Premodern Japanese Literature. (AL)

166S. Chinese Thought from Confucius to Mao. (CZ)

175. Creativity, Self, and Other Cross-Cultural Perspectives. (AL)

177. South Asian Women's Literature. (AL)

205S. Gender and War. (CZ)

207S. Against Textual Hegemony: Voicing Theory from the Margins. (AL)

ARABIC (ARB)

1, 2. Elementary Arabic. (FL) Understanding, speaking, reading, and writing modern standard Arabic. Language laboratory. One course each. *Cooke or Cornell*

63, 64. Intermediate Arabic. (FL) Reading, composition, and conversation in modern standard Arabic. Readings include selections from the Qur'an, contemporary literature, and the Arabic press. One course each. *Cooke or Cornell*

125, 126. Advanced Arabic. (AL, FL) Readings in classical and contemporary fiction and nonfiction. Works include al-Jahiz, Ibn Arabi, Taha Husain, Ibn Battuta, Ghada al-Samman and *1001 Nights*. Prerequisite: Arabic 64 or equivalent. C-L: Comparative Area Studies. One course each. *Cooke or Cornell*

137. Qur'anic Studies. (FL) Introduction to the reading, recitation, grammatical study, and exegesis of selected Qur'anic texts. Prerequisite: Arabic 63, 64 or consent of instructor. One course. *Cornell*

183, 184. Topics in Arabic. (AL, FL) Readings and other material, including films, television, and radio broadcasts. Exercises in composition. Prerequisite: Arabic 126 or consent of instructor. C-L: Comparative Area Studies. One course each. *Cooke*

191, 192. Independent Study. One course each. *Cooke or Cornell*

Courses Currently Unscheduled

100. North African Culture. (AL)

161. Natural Space and Social Life in Morocco. (CZ)

CHINESE (CHN)

1, 2. Elementary Chinese. (FL) Introduction to speaking, understanding, reading, and writing modern standard Chinese (Mandarin, or *putonghua*, based on the Beijing dialect). One course each. *Staff*

1A. Abridged Elementary Chinese. (FL) Fundamentals of spoken and written modern standard Chinese (Mandarin). Intended for post-baccalaureate and summer session students. Consent of instructor required. One course. *Staff*

2A. Abridged Elementary Chinese II. (FL) Prerequisites: Chinese 1A and consent of instructor. One course. *Staff*

4, 5. Elementary Chinese Conversation. (FL) Introduction to spoken Mandarin Chinese with emphasis on basic conversational style. This course supplements Chinese 1, 2 (Elementary Chinese). Students taking Chinese 1, 2 are required to take this course. Half course each. *Staff*

63, 64. Intermediate Chinese. (FL) Reading, oral practice, language laboratory. One and one-half courses each. *Staff*

125, 126. Advanced Chinese. (CZ, FL) Proficiency in speaking, aural comprehension, reading, and writing. Content drawn from newspaper articles, essays, and other readings concerning history, culture, and current political, social, and simple economic issues in China, Taiwan, and Hong Kong. Prerequisite: Chinese 63, 64 or equivalent. C-L: Comparative Area Studies. One course each. *Staff*

171. The Chinese Novel: *Dream of the Red Chamber*. (AL, FL) Eighteenth-century narrative fiction. Topics include: strategies of reading, the work's significance in the cultural history of China, historical reception of the novel during different periods in

China, Taiwan, and in the Western academy. Prerequisites: Chinese 184 or equivalent, and consent of instructor. C-L: Comparative Area Studies. One course. *Wang*

183. Topics in Modern Chinese. (FL) Readings and other material, including films, television, and radio broadcasts. Exercises in composition. Prerequisite: Chinese 125, 126, 127, 129, or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

184. Topics in Modern Chinese. (AL, FL) Readings of modern short stories and essays on special topics of the cultural politics in modern and contemporary China. Additional materials such as films and television. C-L: Comparative Area Studies. One course. *Staff*

191, 192. Independent Study. One course each. *Staff*

Courses Offered in the Duke Study in China Program at Beijing Teachers College and Nanjing University

111A. Intensive Progress in Spoken Chinese—Intermediate Level. (FL) One course. *Staff*

111B. Intensive Progress in Reading Chinese—Intermediate Level. (FL) One course. *Staff*

112A. Intensive Progress in Spoken Chinese—Advanced Level. (FL) One course. *Staff*

112B. Intensive Progress in Reading Chinese—Advanced Level. (FL) One course. *Staff*

127A. Special Topics in Conversation and Composition—Intermediate Level. (FL) Discussion based on oral and written reports and topical readings. Aural comprehension practice. One course. *Staff*

127B. Special Topics in Reading—Intermediate Level. (FL) Reading and discussion of selections from modern Chinese literature, expository prose, and the Chinese press. One course. *Staff*

129A. Special Topics in Conversation and Composition—Advanced Level. (CZ, FL) Discussion based on oral and written reports and topical readings. Aural comprehension practice. One course. *Staff*

129B. Special Topics in Reading—Advanced Level. (CZ, FL) Reading and discussion of selections from modern Chinese literature, expository prose, and the Chinese press. One course. *Staff*

193. Directed Study. Reading and research culminating in a paper, on a topic approved and supervised by the resident director. One course. *Staff*

Courses Currently Unscheduled

142S. Masterpieces of Chinese Literature in Translation. (AL)

147. Literature and Popular Culture in Taiwan: 1960s to the Present. (CZ)

182S. Classical Readings in Chinese Philosophy. (CZ, FL)

185S, 186S. Seminar on Contemporary China. (CZ, FL)

HEBREW (HEB)

1, 2. Elementary Modern Hebrew. (FL) Introduction to speaking, understanding, reading, and writing modern Hebrew. Language laboratory. C-L: Judaic Studies. One course each. *Zakim*

63, 64. Intermediate Modern Hebrew. (FL) Reading, composition, conversation, and language laboratory. Prerequisite: Hebrew 1, 2 or equivalent. C-L: Judaic Studies. One course each. *Zakim*

125, 126. Advanced Modern Hebrew. (AL, FL) Proficiency in reading, writing, and speaking. Readings will include an introduction to modern Hebrew literature and current Israeli journalism. Prerequisite: Hebrew 63, 64 or equivalent. C-L: Judaic Studies. One course each. *Zakim*

191, 192, 193, 194. Independent Study. One course each. *Staff*

HINDI-URDU (HIN)

1, 2. Elementary Hindi-Urdu. (FL) Conversation, basic grammar, and vocabulary; introduction to the Devanagari script and the reading of graded texts. Four hours of classroom work; two hours of language laboratory drill. One course each. *Khanna*

63, 64. Intermediate Hindi-Urdu. (FL) Reading, composition, and conversation. Four hours of classroom work, two hours of language drill. Prerequisites: Hindi-Urdu 1 and 2. One course each. *Khanna*

125, 126. Advanced Hindi. (FL) Proficiency in reading, writing, and speaking. Prerequisite: Hindi 63, 64 or equivalent. One course each. *Khanna*

191, 192. Independent Study. Directed reading and research. Open only to students with prior knowledge of Hindi-Urdu. One course each. *Khanna*

JAPANESE (JPN)

1, 2. Elementary Japanese. (FL) Introduction to speaking, understanding, reading, and writing. One course each. *Endo and staff*

63, 64. Intermediate Japanese. (FL) Practice on advanced spoken and written patterns; reading and discussion. One course each. *Endo and staff*

125, 126. Advanced Japanese. (AL, FL) Readings and other materials, including video. Exercises in composition and conversation. C-L: Comparative Area Studies. One course each. *Yanagida*

183S, 184S. Topics in Japanese. (AL, FL) Readings and other materials, including television and radio broadcasts. Exercises in composition. Consent of instructor required. C-L: Comparative Area Studies. One course each. *Ching*

191, 192. Independent Study. One course each. *Ching*

193, 194. Independent Study. One course each. *Staff*

Courses Currently Unscheduled

10-11. Intensive Elementary Japanese. (FL)

100. Cultural Identification and Self-Identification in Modern Japan. (AL)

KOREAN (KOR)

1, 2. Elementary Korean. (FL) Introduction to speaking, understanding, reading, and writing Korean. One course each. *Staff*

63, 64. Intermediate Korean. (FL) Spoken and written Korean. One course each. *Staff*

125, 126. Advanced Korean. (CZ, FL) Proficiency in speaking, aural comprehension, reading, and writing. Prerequisite: Korean 63, 64 or equivalent. C-L: Comparative Area Studies. One course each. *Staff*

191, 192. Independent Study. One course each. *Staff*

PERSIAN (PER)

101, 102. Introduction to Persian Literature. (AL, FL) An introduction to classical Persian literature through the reading and translation of selected prose and poetry texts. Prerequisites: Persian 64 or the equivalent, and consent of instructor. One course each. *Lawrence*

Courses Currently Unscheduled

1, 2. Elementary Persian. (FL)

63, 64. Intermediate Persian. (FL)

SWAHILI (SWA)

1, 2. Elementary Swahili. (FL) Swahili language and culture with emphasis on conversation. Intensive work in language laboratory; drill sessions with native speakers. One course each. *O'Barr*

63, 64. Intermediate Swahili. (FL) Continuation of Swahili 1 and 2. Emphasis on contemporary Swahili literature. One course each. *O'Barr*

191, 192. Independent Study. One course each. *O'Barr*

Astronomy

For courses in astronomy, see Physics.

Biochemistry

For courses in biochemistry, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates; also see Biology and Chemistry majors.

Biological Anthropology and Anatomy (BAA)

Professor Kay, *Chair*; Associate Professor Van Schaik, *Director of Undergraduate Studies*; Professors Cartmill, Glander, Hylander, Simons, and Terborgh; Associate Professors Roth and Smith; Assistant Professors Bassett, Maas, Pope, and White; Professor Emeritus La Barre; Associate Professor Emeritus Duke

A major is available in this department.

Biological Anthropology and Anatomy is an interdisciplinary department centering on the origin and evolution of human beings and their close biological relatives. The department and its course offerings have three general focuses: primate behavior and ecology, primate paleontology, and functional and comparative anatomy. Significant opportunities for independent research are found at the Duke Primate Center, which houses a unique and diverse range of nonhuman primates, especially prosimians from Madagascar. Advanced students can study original fossils and casts at the Primate Center and in the department's laboratories in the Medical Center, which also afford opportunities to study comparative anatomy from an adaptive and evolutionary perspective. Students interested in the Primatology Program should be aware that Biological Anthropology and Anatomy 93D is a program requirement. For further information on the Primatology Program contact the program chair at the department.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

93. Introduction to Biological Anthropology. (NS) Origins and distribution; primate evolution; a survey of human paleontology and human biology, prehistory, and language; and the origins of human social organization and culture. One course. *Staff*

93D. Introduction to Biological Anthropology. (NS) Same as Biological Anthropology and Anatomy 93 except instruction is provided in two lectures and one small laboratory meeting each week. One course. *Staff*

132. Human Evolution. (NS) Evolutionary biology of the primates. Anatomical and behavioral adaptations and phylogeny of fossils and living primates including *Homo sapiens*. Prerequisites: Biological Anthropology and Anatomy 93 or equivalent. One course. *Cartmill, Glander, Simons, or staff*

133. The Human Body. (NS) Human gross anatomy seen from a functional and evolutionary perspective. Laboratory involving study of prosected cadavers and other anatomical preparations. Prerequisites: Biological Anthropology and Anatomy 93. One course. *Cartmill or White*

143. Primate Ecology. (NS) A survey of primate ecology and behavior. Prerequisites: Biological Anthropology and Anatomy 93 or consent of instructor. One course. *Glander, Simons, Van Schaik, White, or staff*

144L. Primate Field Biology. (NS) Survey of field methods used to document primate behavior. Laboratory includes observations of free-ranging primates at the Duke Primate Center. One course. *Pope or staff*

146. Sociobiology. (NS) Sociobiological theory reviewed and applied to the social behavior of nonhuman primates, hominids, and humans. Prerequisites: Biological Anthropology and Anatomy 93. One course. *Van Schaik*

151. Anatomy of the Lower Extremities. (NS) Introduction to the functional anatomy of the lower extremities. Does not count for biological anthropology and anatomy major requirements. Consent of instructor required. One course. *Bassett*

172S. Primate Anatomy. (NS) The comparative anatomy of primates from the perspective of adaptation and phylogeny. Laboratory includes some dissection or prosection of human and nonhuman primates. One course. *Kay or staff*

180. Current Issues in Biological Anthropology and Anatomy. (NS) Selected topics in methodology, theory, or area. One course. *Staff*

180S. Current Issues in Biological Anthropology and Anatomy. (NS) Same as Biological Anthropology and Anatomy 180 except instruction is provided in seminar format. One course. *Staff*

183. Primate Social Complexity and Intelligence. (NS) Information on primate social behavior and cognition used to examine ideas on the origins and functions of primate intelligence. Topics include communication, "ape language," alliances and reciprocity, deception and social manipulation, and the extent of awareness inferable from behavior in the wild and from experiments in captivity. One course. *Staff*

184. Primates and Tropical Forest Conservation. (NS) Main concepts of conservation biology, both at the species and community level, focusing on tropical rain forest habitats and primates. Relevant aspects of biogeography, ecology and demography; tropical deforestation, causes and consequences; conservation strategies (objectives, design of protected area networks, threats). One course. *Van Schaik*

185. Current Issues in Primatology. (NS) Selected topics in primate behavior, ecology, and conservation. Consent of instructor required. One course. *Staff*

186S. Research Internship in Primatology. (NS) Consent of instructor required. See C-L: Interdisciplinary Course 186S. One course. *Glander or White*

187S. Senior Seminar in Primatology. (NS) Consent of instructor required. See C-L: Interdisciplinary Course 187S. One course. *Glander or White*

193. Independent Study. Directed reading and research. Open only to qualified seniors, with consent of director of undergraduate studies. One course. *Staff*

195S, 196S. Senior Seminar. Prerequisites: BAA 93, a 100-level course in biological anthropology and anatomy, and consent of director of undergraduate studies. One course each. *Staff*

For Seniors and Graduates

238S. Functional and Evolutionary Morphology of Primates. (NS) History and functional significance of locomotor and feeding adaptations, craniofacial morphology, sense organs, and reproductive systems in primates, including *Homo sapiens*. Consent of instructor required. Prerequisites: Biological Anthropology and Anatomy 172S or equivalent. One course. *Cartmill, Kay, or staff*

244L, S. Comparative Primate Ecology. (NS) Comparisons of the evolutionary ecology of prosimians, monkeys, and apes. With field methods. Prerequisites: Biological Anthropology and Anatomy 93 and 143 recommended. One course. *Glander or White*

245S. Primate Social Evolution. (NS) Ecological determinants of, and biological constraints on, social strategies and systems. Emphasis on primates. Prerequisites: Biological Anthropology and Anatomy 93; 143, 144L, or 146; or consent of instructor. One course. *Van Schaik*

246. The Primate Fossil Record. (NS) A survey of fossil primates including early humans. The diversity, anatomy, and behavior of primates as related to the origin and spread of past primates. The radiation of each main group of primates in the succession leading to humans illustrated with slides, casts, and fossils. Topics include geochemical dating, timing of molecular clocks, and various procedures for classifying primates. One course. *Simons*

247. The Hominid Fossil Record. (NS) Origin and successive stages of development of human ancestors. Detailed analysis of adaptive types and cultural developments. Personalities and current controversies in the study of hominid paleontology. Prerequisites: Biological Anthropology and Anatomy 93, 132, or consent of instructor. One course. *Simons*

248S. Evolution of Mammals. (NS) The origin, adaptive radiation, and phylogenetic relationships of mammals, as inferred from the fossil record. Consent of instructor required. One course. *Maas*

249S. Social Behavior and Evolutionary Change. (NS) The influence of social structure on rate and direction of evolutionary change, including speciation, with emphasis on primate social systems. Mating systems, dispersal patterns, and mechanisms of new social group formation examined from the perspective of their effects on the genetic structure of populations, and species radiations. Prerequisites: Biological Anthropology and Anatomy 143, or 144, or 146. One course. *Pope*

250. Biometry. (QR) A practically oriented overview of the statistical analysis of biological data. Topics include data collection and experimental design, methods and techniques of data organization, use of computing programs and packages, applications

of appropriate parametric and nonparametric statistical techniques, assumptions and problems encountered with biological data analysis, and interpretation of results. Prerequisites: Mathematics 136, Psychology 117, Sociology 133, Statistics 10D, 110, 112, 114, 213, or equivalent, and consent of instructor required. One course. *White*

280S, 281S. Seminar in Selected Topics. (NS) Special topics in methodology, theory, or area. Consent of instructor required. One course each. *Staff*

287S. Macroevolution. (NS) Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisites: Biology 21L and 22L or equivalents. C-L: Biology 287S. One course. *Roth*

289. Comparative Mammalian Anatomy. (NS) A practical survey of anatomical diversity in mammals. An emphasis on dissections of a broad variety of mammals. A broader perspective on specific anatomical features provided in the lectures. One course. *Staff*

290. Pattern and Process in Vertebrate Development. (NS) Research results on developmental processes applied to classic problems of comparative vertebrate biology. Specific focus to vary, but to include cell differentiation and migration, induction, cell-cell interaction and cell mechanics as well as craniofacial morphogenesis, development and evolution, developmental constraints and comparative embryology. Prerequisites: course in comparative or human anatomy and consent of instructor. C-L: Biology 290. One course. *Smith*

292S. Topics in Morphology and Evolution. (NS) Various aspects of vertebrate morphology and evolution, including major historical approaches to the interpretation of morphology; the evolution, development, and function of specific morphological structures; and patterns of vertebrate evolution. Consent of instructor required. One course. *Smith*

COURSES CURRENTLY UNSCHEDULED

293, 294. Evolutionary Theory. (NS)

THE MAJOR

For the A.B. Degree

Prerequisite. Biological Anthropology and Anatomy 93 or 93D.

Corequisites. Cultural Anthropology 94, 94D, or 100; and Biology 21L or 22L.

Major Requirements. Eight courses are required, not including the above prerequisites and corequisites, distributed in the following manner:

—Biology Anthropology and Anatomy 132.

—At least four courses selected from the Biological Anthropology and Anatomy present course listings (with the exception of Biological Anthropology and Anatomy 151).

The remaining courses may be selected from Biological Anthropology and Anatomy courses numbered 100 or above or from approved courses in other social and biological sciences departments (for example, Biology 108L, 110L, 149, 201L, S, 215, 234S, 237L, and 287S; Psychology 103, 111, and 150S.)

For the B.S. Degree

Prerequisite. Biological Anthropology and Anatomy 93 or 93D.

Corequisites. Biology 21L or 22L, or equivalent; Chemistry 11L, 12L, and 151L; Mathematics 31 and 32; Physics 51L and 52L, or 53L and 54L.

Major Requirements. Eight courses are required in the biological and geological sciences, not including the above prerequisites and corequisites. Of these eight courses, at least five courses must be selected from the Biological Anthropology and Anatomy present course listings; up to three courses in other biological sciences, psychology, or geology, approved by the advisor. One of these eight courses must include related laboratory/field experience; an independent study course may be counted toward the laboratory/field experience requirement. At least one of the courses must concern statistics or quantitative methods (Biological Anthropology and Anatomy 250, Statistics 100 level or Psychology 117, or equivalent). At least two of these eight courses must be at the 200 level. Geology 72 is strongly encouraged for students with interests in paleontology.

Honors/Distinction. Qualified majors are encouraged to participate in special work leading to graduation with distinction in biological anthropology and anatomy. See the section on honors in this bulletin for general requirements. Any major with a *B+* average (3.3 gpa) in biological anthropology and anatomy courses and with a *B* average (3.0 gpa) in all courses is eligible. Students who desire to undertake honors work should request a member of the biological anthropology and anatomy faculty to recommend their names to the director of undergraduate studies. To receive departmental honors a major must complete a paper involving significant independent research or scholarship and pass an oral examination on the paper conducted by an appointed committee of faculty members, at least two of whom should be in biological anthropology and anatomy. Normally, students will prepare their papers over the course of the senior year working in close collaboration with their committees and receiving on the average two course credits in independent study for the work.

Biology (BIO)

Faculty in Botany: Professor Searles, *Chair*; Associate Professor Kohorn, *Director of Undergraduate Studies in Biology*; Lecturer Bush, *Associate Director of Undergraduate Studies in Biology*; Professors Antonovics, Barber, Boynton, Christensen, W. Culberson, Ramus, Reynolds, Schlesinger, Siedow, Stone, Strain, Terborgh, White, and Wilbur; Associate Professors Knoerr and Vilgalys; Assistant Professors Clark, Dong, Homma, and Sun; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Research Professors C. Culberson and Patterson; Associate Research Professor Harris; Adjunct Professors Funk, Kress, Osmond, Rogers, and Wagner; Adjunct Associate Professors Lacey, Mishler, Swofford, and Zimmer; Lecturer Armaleo

Faculty in Zoology: Professor H. Nijhout, *Chair*; Professors Barber, Brandon, Forward, Gillham, Klopfer, Laurie, Livingstone, McClay, Nicklas, Rausher, Simons, Staddon, Terborgh, Tucker, Uyenoyama, Vogel, Wainwright, and Ward; Associate Professors Nowicki, Rittschof, Roth, K. Smith, and Van Schaik; Assistant Professors Crenshaw, Cunningham, Fehon, and Morris; Professors Emeriti Bailey, Bookhout, Costlow, Fluke, Gregg, and Schmidt-Nielsen; Assistant Professors of the Practice Mercer and Motten; Research Assistant Professor Roach; Adjunct Professor Schmidt-Koenig; Adjunct Associate Professor M. Nijhout

A major is available in biology.

The biology courses and the biology major are cooperatively administered by the Department of Botany and the Department of Zoology. Additional courses in biosciences are offered by the departments of Biological Anthropology and Anatomy, Chemistry, and Psychology in Trinity College of Arts and Sciences; by the basic sciences departments in the School of Medicine; and by the schools of Engineering and of the Environment.

Biology 21L and 22L constitute the normal introductory courses for students planning to major in the biological sciences and are prerequisites for intermediate and

advanced courses in biology. The two courses may be taken in either order, and students majoring in biology may take their second course in the sequence concurrently with an intermediate level course, as appropriate. For nonmajors, either course, or both, may count for the area requirement in the natural sciences. Biology 19 also meets the introductory requirement by advanced placement. Biology 20L by transfer credit meets one semester of the requirement .

10L. Marine Biology. (NS) Physical and chemical characteristics of marine ecosystems and the functional adaptations of marine organisms to these systems. Lectures, field trips, and laboratories. For students not majoring in a natural science. (Given at Beaufort.) C-L: Marine Sciences. One course. *Staff*

19. General Biology. Credit for advanced placement on the basis of the College Board Examination in biology. Equivalent to Biology 21L and 22L as prerequisite. One course.

20L. Introductory Biology. (NS) Credit for introductory biology by transfer of college-level work not corresponding to either Biology 21L or 22L in content, but including laboratory work. May be counted toward Natural Sciences Area of Knowledge. One course.

21L. Introduction to Organismal and Environmental Biology. (NS) The basic principles of genetics, population genetics, evolution, ecology, and physiology of animals and plants. The diversity and phylogeny of unicellular organisms and of plants. May be taken before or after Biology 22L. One course. *Motten and staff*

22L. Introduction to Cellular and Developmental Biology. (NS) The basic principles of cell biology, photosynthesis, metabolism, molecular biology, immunology, and development of animals and plants. The diversity and phylogeny of animals. May be taken before or after Biology 21L. One course. *Motten and staff*

43D. Ecology and Society. (NS) Ecological concepts and their application to human society. Intended for nonscience majors. One course. *Bush*

45S. Structure. The structural design principles that underlie function, failure, and fancy in natural and manmade things. Gaps and connections between science and art. Lectures and tasks for minds and hands on worldly designs. Does not count toward the areas of knowledge requirements. One course. *Wainwright*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50. Life's Beginnings. (NS) Cells, molecules, and evolution from the start. The origin and evolution of life on earth as a case study in science as a human enterprise and as a way of knowing. Intended for non-biology majors. One course. *Nicklas*

53. Introductory Oceanography. (NS) Basic principles of physical, chemical, biological, and geological oceanography. Fee for required field trip to the Marine Laboratory. C-L: Geology 53. One course. *Pilkey (geology) and Searles*

90. Plants and Civilization. (NS) The biological nature of crop plants, the world's major economic plants, and the origins and evolution of agriculture. One course. *W. Culberson or Wilbur*

92S. Social Implications of Genetics. (NS) The positive and negative implications of genetics for society. Development of the field of human genetics in parallel with the science as a whole and investigation of the advances that have occurred in the diagnosis, treatment, and prevention of genetic disease. Open only to students in the FOCUS Program. One course. *Staff*

93S. Changing Human Environments. (NS) General patterns of change in global environments during the past four million years explored in relation to prehistoric and historic evolution. The reciprocal relationships between landscape and global ecological change and human land use. The potential future role of these relationships. Open only to students in the FOCUS Program. One course. *Antonovics*

100. Perspectives on Living Systems. (NS) For upperclass students not intending majors in a biological science. One course. *Staff*

101. Biogeography in an Australian Context. (NS) Distribution of plants and animals in space and time as determined by the interaction of geophysics, geology, climate, and evolutionary history. Special emphasis on the unique terrestrial and marine faunas and floras of the Australian continent. One course. *Searles*

102. Trees and Shrubs of North Carolina. (NS) Identification and natural history of the trees, shrubs, and woody vines. Emphasis on those cultivated or occurring naturally in North Carolina. One course. *Wilbur*

103L. General Microbiology. (NS) Classical and modern principles of the structure, physiology, and genetics of microorganisms and their roles in human affairs. Prerequisite: one course in a biological science or consent of instructor. One course. *Vilgalys*

108L. Developmental and Comparative Anatomy of Vertebrates. (NS) The embryology, anatomy, and evolutionary development of vertebrate organ systems. Prerequisites: Biology 21L and 22L. One course. *Staff*

110L. Ecology. (NS) Physical, chemical, and biological processes that determine the distribution and abundance of plants and animals, emphasizing physiological responses, population dynamics, species interaction, biogeography, nutrient cycling, and energy flow through food webs. Laboratory includes fieldwork. Prerequisites: Biology 21L and 22L; and Mathematics 31. One course. *Livingstone and Schlesinger or Reynolds*

112. Population Biology. (NS) How and why the abundances of animals and plants change in space and time. Growth of human and other populations, ecological interactions between populations (competition, predation, and mutualism), and conservation of threatened populations. Prerequisites: Biology 21L and Mathematics 31. One course. *Morris*

113L. Behavioral Ecology. (NS) How ecological factors shape foraging, mating, aggressive, and social behavior. Laboratory experiments and field observations from the Outer Banks environment. Independent projects and seminars. (Given at Beaufort in the summer.) Prerequisites: Biology 21L and 22L. C-L: Marine Sciences. One and one-half courses. *Rubenstein (visiting summer faculty)*

114. Biological Oceanography. (NS) Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms. (Given at Beaufort in the fall or spring.) Prerequisites: Biology 21L and 22L. C-L: Marine Sciences. One course. *Ramus*

114L. Biological Oceanography. (NS) Laboratory course version of Biology 114. (Given at Beaufort in the summer.) Prerequisites: Biology 21L and 22L. C-L: Marine Sciences. One and one-half courses. *Ramus*

120. Principles of Evolution. (NS) Evidence for evolution; mechanisms of micro- and macro-evolutionary change. Genetic change in populations. Ecological, behavioral, molecular forces influencing genetic change. Speciation; phylogenetic reconstruction. Prerequisite: Biology 21L. One course. *Antonovics, Rausher, or Roth*

123. Analysis of Ocean Ecosystems. (NS) The history, utility, and heuristic value of the ecosystem; ocean systems in the context of Odum's ecosystem concept; structure and

function of the earth's major ecosystems. (Given at Beaufort.) Prerequisite: one year of biology, one year of chemistry, or consent of instructor. C-L: Marine Sciences. One course. *Barber*

140L. Plant Diversity. (NS) Major groups of living plants, their evolutionary origins and phylogenetic relationships. Fee for field trip. Prerequisite: introductory biology. One course. *Searles or Wilbur*

142L. Plant Systematics. (NS) Surveys major groups. Principles of vascular plant taxonomy with practice in identification of local flora. Lectures, laboratories, and field trips. One course. *Wilbur*

150L. Physiology of Marine Animals. (NS) Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. One course (fall); one and one-half courses (summer). (Given at Beaufort.) Prerequisites: Biology 21L and 22L; and chemistry. C-L: Marine Sciences. Variable credit. *Forward*

151L. Principles of Animal Physiology. (NS) Functional aspects of respiration, circulation, neural and hormonal coordination, water balance, metabolism, thermoregulation, and responses to special environments. Prerequisites: Biology 22L and Chemistry 12L. One course. *Crenshaw or Tucker*

152. Molecular Basis of Plant Functioning. (NS) Principal physiological processes of plants, including respiration, photosynthesis, water relations, and factors associated with plant morphogenesis. Prerequisites: Biology 21L and one year of chemistry; organic chemistry is desirable. One course. *Siedow and Sun*

154. Principles of Neurobiology. (NS) Introduction to neuroscience, including basic physiology, microstructure, and anatomy of neural tissues; mechanisms of neuronal development and integration; sensory-motor control; the neural foundations of animal behavior, and the evolution of nervous systems. Prerequisites: Biology 21L and 22L, and Chemistry 12L or equivalent. C-L: Psychology 135. One course. *Nowicki*

155L. Biochemistry of Marine Animals. (NS) Functional, structural, and evolutionary relationships of biochemical processes of importance to marine organisms. (Given at Beaufort.) Prerequisites: Biology 21L and 22L; Chemistry 11L, 12L. C-L: Marine Sciences. One course. *Rittschof*

160. Principles of Cell Biology. (NS) Structure and function of organelles, metabolism, and regulatory mechanisms. Prerequisites: Biology 22L and Chemistry 12L. One course. *Kohorn, McClay, or M. Nijhout*

164D. Developmental Biology. (NS) Principles and problems of development and differentiation. Embryology, molecular and cellular mechanisms of determination, embryonic induction, and differentiation; developmental genetics, morphogenesis, and pattern formation. Attention to current literature. Prerequisite: Biology 160. C-L: The University Program in Genetics. One course. *Fehon*

169L. Marine Communities. (NS) Dynamics of marine communities in the context of current ecological theory. Life history strategies, competition, predation, diversity, and stability; detailed considerations of benthic and pelagic communities. (Given at Beaufort.) Prerequisites: Biology 21L and 22L, and Mathematics 31. C-L: Marine Sciences. One course. *Gerhart (environment)*

176L. Marine Invertebrate Zoology. (NS) Structure, function, and development of invertebrates collected from estuarine and marine habitats. Not open to students who have taken Biology or Zoology 274L. One course (fall); one and one-half courses (summer). (Given at Beaufort.) Prerequisites: Biology 21L and 22L. C-L: Marine Sciences. Variable credit. *Kirby-Smith (environment)*

180. Principles of Genetics. (NS) Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisites: Biology 21L and 22L. C-L: The University Program in Genetics. One course. *Antonovics, Boynton, Gillham, and Laurie*

184L. Experimental Cell and Molecular Biology. (NS) Experimental approaches to contemporary questions in cell and molecular biology. Practical laboratory training in molecular genetics, protein chemistry and other methods used in the rapidly developing field of biotechnology. Experiments include cloning and sequencing genes, characterizing gene regulation and exploring protein structure/function relationships and subcellular localization. Prerequisite: Biology 160 or 180. One course. *Armaleo, Dong, Kohorn, Siedow, or Sun*

191, 192. Independent Study. For junior and senior majors with consent of director of undergraduate studies and supervising instructor. Three courses of 191, 192, 193T, and 194T, maximum. Variable credit. *Staff*

193T, 194T. Tutorial. (NS) For junior and senior majors with consent of director of undergraduate studies and supervising instructor. Three courses of 191, 192, 193T, and 194T, maximum. Variable credit. *Staff*

195S, 196S. Seminar in Biology. (NS) Variable credit. *Staff*

199S. The Changing Biosphere: Past, Present, and Future. (NS) Consent of instructor required. See C-L: Distinguished Professor Course 199S. One course. *Billings*

For Seniors and Graduates

201L, S. Animal Behavior. (NS) Survey of past developments and current controversies in animal behavior. Extensive readings, followed by individual experimental or descriptive projects in the laboratory or field (or Primate Center). Recommended background: Biology 21L and 22L, Biology 151L, and statistics, or equivalents. One course. *Klopfer*

203L. Marine Ecology. (NS) Factors that influence the distribution, abundance, and diversity of marine organisms. Course structure integrates lectures, field excursions, and independent research projects. Topics include characteristics of marine habitats, adaptation to environment, species interactions, biogeography, larval recruitment, rocky shores, marine mammals, fouling communities, tidal flats, beaches, subtidal communities, and coral reefs. One course (fall and spring); one and one-half courses (summer). (Given at Beaufort.) Prerequisite: none; suggested—introductory ecology, invertebrate zoology, or marine botany. C-L: Environment 219L and Marine Sciences. Variable credit. *Staff*

206S. Controversies in Biology. (NS) A contentious theme for reading, discussion, and an individual or joint paper. Illustrative past topics: the nature of the creative process, causality in biological thought, the lack of political impact of many scientific developments. Open to nonmajors. One course. *Klopfer*

209L. Lichenology. (NS) Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. One course. *C. Culberson and W. Culberson*

212L, S. Phycology. (NS) Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. One course. *Searles*

215. Tropical Ecology. (NS) Ecosystem, community, and population ecology of tropical plants and animals with application to conservation and sustainable develop-

ment. Prerequisite: a course in general ecology. C-L: Environment 217. One course. *Terborgh*

216L. Limnology. (NS) Lakes, ponds, and streams; their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities. Laboratory includes field trips. Offered biennially. Prerequisites: Biology 21L and 22L, and Chemistry 12L and Mathematics 32 and physics; or equivalents; or consent of instructor. One course. *Livingstone*

218L. Barrier Island Ecology. (NS) An integration of barrier island plant and animal ecology within the context of geomorphological change and human disturbance. Topics include: barrier island formation and migration, plant and animal adaptations, species interactions, dune succession, maritime forests, salt marshes, sea level rise, conservation policy, and restoration ecology. Field trips to many of the major North Carolina barrier islands. Strong emphasis on field observation and independent research. (Given at Beaufort.) Prerequisite: introductory biology; suggested: course in botany or ecology. C-L: Environment 218L and Marine Sciences. One and one-half courses. *Evans, Peterson, and Wells (visiting summer faculty)*

220L. Mycology. (NS) Survey of the major groups of fungi with emphasis on life history and systematics. Field and laboratory exercises. One course. *Vilgalys*

229L, S. Paleocology. (NS) Global change over the last two million years. Prerequisites: two semesters of biology or geology; and one semester each of calculus, chemistry, and physics; or consent of instructors. One course. *Bush, Clark, and Livingstone*

232. Microclimatology. (NS) Introduction to the micrometeorological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. C-L: Environment 232. One course. *Knoerr*

234S. Problems in the Philosophy of Biology. (NS) Consent of instructor required. See C-L: Philosophy 234S. One course. *Brandon*

237L. Systematic Biology. (NS) Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: Biology 21L and 22L or equivalents. One course. *Staff*

241. Field Botany. (NS) Identification and recognition of the vascular flora of the Carolinas. Frequent field trips to representative habitats. Prerequisite: introductory plant identification course or consent of instructor. One course. *Wilbur*

243L. Evolution and Classification of Angiosperms. (NS) Characteristics and phylogenetic relationships of major flowering plant lineages. Emphasis on current literature, rigorous methods, modern controversies, and biological and biogeographic implications of relationships. Prerequisite: Biology 142L or equivalent. One course. *Funk, Kress, and Wagner*

244. Principles of Immunology. (NS) An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Biology 160 and Chemistry 151L or equivalents. C-L: Immunology 244. One course. *Kostyu (immunology), McClay, and staff*

249. Comparative Biomechanics. (NS) The structure and operation of organisms in relation to the mechanics of solids and fluids, including readings from the primary literature. Not open to students who have taken Biology 149. Prerequisites: Mathematics 31 and Physics 51L or equivalents. One course. *Vogel and Wainwright*

256L. S. Plant Biosystematics. (NS) Descriptive and experimental procedures used to assess systematic implications of plant evolution. Laboratory, discussion, and field-oriented problems. Prerequisites: basic courses in systematics and genetics. One course. *Staff*

257L. Molecular Systematics and Evolution. (NS) Descriptive and experimental procedures used to assess evolutionary diversity for analysis of population genetics and systematic relationships. Laboratory problems, discussion, and individual research projects. Prerequisites: basic course work in systematics, evolution, and genetics. One course. *Vilgalys*

262. Biology of Parasitism. (NS) How parasites, from viruses through vertebrates, have solved the special problems associated with their dependence on other organisms. Emphasis on life cycles, host-parasite interactions, and experimental parasitology. Intended for seniors. Prerequisites: Biology 22L and 160 or equivalents. One course. *M. Nijhout*

265L. Physiological Plant Ecology. (NS) The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Biology 110L and 152 or equivalents. One course. *Strain*

267L. Community Ecology. (NS) Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and weekend field trips. Prerequisites: an introductory ecology course and consent of instructor. One course. *Christensen*

269. Advanced Cell Biology. (NS) Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Cell and Molecular Biology, Cell Biology 269, and Immunology 269. One course. *Siedow and staff*

272. Biogeochemistry. (NS) Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12L or equivalent. C-L: Geology 272. One course. *Schlesinger*

274L. Biology of Marine Invertebrates. (NS) Systematic survey of the principal marine invertebrate taxa, with emphasis on structure, function, behavior, and ecology. Field trips and independent projects. Not open to undergraduates who have taken Biology 176L. (Given at Beaufort.) Prerequisites: introductory biology (Biology 21L and 22L). C-L: Environment 297L and Marine Sciences. One and one-half courses. *Dimock (visiting summer faculty)*

281. DNA, Chromosomes, and Evolution. (NS) The relationship of chromosome and DNA-sequence organization with evolution; karyotype changes and speciation; repetitive DNA, split genes, transposable elements, and evolutionary mechanisms; phylogeny reconstruction; evolution of mitosis and the chromosome cycle. Prerequisite: an introductory course in genetics or cell or molecular biology, or consent of instructor. C-L: The University Program in Genetics. One course. *Laurie and Nicklas*

283. Molecular Genetics of Organelles. (NS) Genetics, biochemistry, and molecular biology of the organelles of eukaryotic cells, and cellular symbionts. Emphasis on recent literature. Prerequisite: introductory genetics. C-L: The University Program in Genetics. One course. *Boynton and Gillham*

284. Molecular Population Genetics. (NS) Theoretical and computational basis of evolutionary biology at the sequence level. Models of nucleotide and amino acid

substitution; distance measures; distance methods for phylogeny reconstruction; tests of neutrality, adaptive selection, and hitchhiking; methods for distinguishing between common ancestry and adaptation; case histories of molecular evolution. For graduate students and upper-level undergraduates with coursework in genetics or evolution or mathematics. One course. *Uyenoyama*

285S. Ecological Genetics. (NS) Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Biology 180 and 286 or equivalents. C-L: The University Program in Genetics. One course. *Antonovics*

286. Evolutionary Mechanisms. (NS) Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisites: Biology 21L and 22L, and Biology 180 or equivalents. C-L: The University Program in Genetics. One course. *Antonovics, Rausher, and Uyenoyama*

287S. Macroevolution. (NS) Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisites: Biology 21L and 22L or equivalents. C-L: Biological Anthropology and Anatomy 287S. One course. *Roth*

288. Mathematical Population Genetics. (NS) Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating systems, sex ratio, stochastic processes. Prerequisites: calculus; statistics and linear algebra recommended. C-L: The University Program in Genetics. One course. *Uyenoyama*

289L. Methods in Morphometrics. (QR) Techniques for the acquisition and analysis of quantitative data for describing and comparing biological form. Topics include: image capture and analysis, two- and three-dimensional digitization, and multivariate and geometric techniques such as allometric analysis, outline and landmark-superposition methods, and deformation models. Background in statistics and linear algebra recommended. One course. *Mercer*

290. Pattern and Process in Vertebrate Development. (NS) Prerequisites: course in comparative or human anatomy and consent of instructor. See C-L: Biological Anthropology and Anatomy 290. One course. *Smith*

295S, 296S. Seminar. (NS) Variable credit. *Staff*

COURSES CURRENTLY UNSCHEDULED

145. Physical Radiations and Biological Significance. (NS)

222L. Entomology. (NS)

261. Photosynthesis. (NS)

THE MAJOR

The Bachelor of Arts and the Bachelor of Science degrees are offered with a major in biology or in an individually designed interdepartmental concentration approved by the director of undergraduate studies in biology. Information about the biology major may be obtained in the office of the director of undergraduate studies.

For the A.B. Degree

This degree program is the general liberal arts major program. Students contemplating a career in biological or biomedical sciences should elect the program leading to the B.S. degree.

Prerequisites. Biology 21L and 22L, or equivalent.

Corequisites. Chemistry 11L, 12L; Mathematics 31, 32; plus three science-related courses outside the biological sciences selected from an approved list of such courses.

Major Requirements. A minimum of eight full courses in at least eight course registrations in the biosciences, not including the above prerequisites and corequisites or courses specified not for science majors; two of these courses must include related laboratory experience; one laboratory independent study course may be counted toward the laboratory requirement. The eight courses must include one core course from each of three areas: cell biology and genetics; organism structure and function; and ecology, evolution, and systematics. These courses are prerequisites to many of the advanced courses in these subject areas. Five of these eight courses must be in biology. The remaining courses may be elected from among courses numbered 100 or above in biology, or from approved courses in the basic science departments of the School of Medicine, or from approved courses of a basic biological character in related departments. The elective courses acceptable for a biology major with an area of concentration (see below) are defined by the requirements for that concentration. At least one of these eight courses must be at the 200 level.

For the B.S. Degree

This is the program in biology for students contemplating a career in biological or biomedical sciences.

Prerequisites. Biology 21L and 22L, or equivalent.

Corequisites. Chemistry 11L, 12L, and 151L; Mathematics 31, 32; Physics 51L or 53L and 52L or 54L. Additional corequisites may be required for particular areas of concentration (see below).

Major Requirements. A minimum of eight full courses in at least eight course registrations in the biosciences, not including the above prerequisites and corequisites or courses specified not for science majors; two of these courses must include related laboratory experience; one laboratory independent study course may be counted toward the laboratory requirement. The eight courses must include one core course from each of three areas: cell biology and genetics; organism structure and function; and ecology, evolution, and systematics. These courses are prerequisites to many of the advanced courses in these subject areas. Five of these eight courses must be in biology. The remaining courses may be elected from among courses numbered 100 or above in biology, or from approved courses in the basic science departments of the School of Medicine, or from approved courses of a basic biological character in related departments. The elective courses acceptable for a biology major with an area of concentration (see below) are defined by the requirements for that concentration. At least one of these eight courses must be at the 200 level.

For Areas of Concentration

Students may elect to complete requirements in specified areas of concentration. Currently available areas of concentration in the biology major are: animal behavior, biochemistry, cell and molecular biology, evolutionary biology, genetics, marine biology, neuroscience, pharmacology, and plant systematics. Certification in an area of concentration is designated on the official transcript. For information on areas of concentration see the director of undergraduate studies.

The Negotiated Major

As an alternative to the above programs, a student with unusual interests in biology may arrange a negotiated concentration of study. After appropriate discussion with departmental faculty, a student may devise a program of study which must be endorsed by two members of the faculty and approved by the director of undergraduate studies. The statement of the proposed program must make clear why the negotiated major is more appropriate than a conventional major. Such a program must be arranged before the start of a student's fifth semester. The only formal limitation on this approach to the major is that it include at least five courses in biology to meet minimum Trinity College requirements.

Honors/Distinction

A program for graduation with distinction in biology is available. See the section on honors in this bulletin. The director of undergraduate studies can provide more details.

Botany (BOT)

Professor Searles, *Chair*; Professors Antonovics, Barber, Boynton, Christensen, W. Culberson, Ramus, Reynolds, Schlesinger, Siedow, Stone, Strain, Terborgh, White, and Wilbur; Associate Professors Knoerr, Kohorn, and Vilgalys; Assistant Professors Clark, Dong, Homma, and Sun; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Research Professors C. Culberson and Patterson; Associate Research Professor Harris; Adjunct Professors Funk, Kress, Osmond, Rogers, and Wagner; Adjunct Associate Professors Lacey, Mishler, Swofford, and Zimmer; Lecturers Armaleo and Bush

See Biology for a description of the major and the list of courses taught by the botany faculty.

Canadian Studies Program

Professor Thompson (history), *Director*; Professors Davis (history), Kornberg (political science), Maddox (sociology), Paletz (political science), Richardson (environment), J. Smith (sociology), Tiryakian (sociology), Warren (community and family medicine), and Wood (history); Associate Professor Kimbrough (economics); Assistant Professors Mayer (public policy) and S. Smith (public policy); Professors Emeriti Cahow (history), Preston (history), and Tuthill (economic geography); Associate Professor Emeritus Hull (Romance studies); Research Professor Davidson (international studies); Adjunct Professor Steen (environment); Adjunct Associate Professors Keineg (Romance studies) and Wilson (history)

A second major or a certificate is available in this program.

The program in Canadian Studies seeks to provide the student with an understanding of Canada and its problems and prospects. Students may undertake the program to supplement another major, or to complete a second major in Canadian Studies, or as part of an interdepartmental concentration, or under Program II. Canadian Studies may also be an area concentration in the comparative area studies major, described elsewhere in this bulletin. See sections below on the program and the major. The courses are described in the departmental and interdisciplinary listings.

COURSES WITH CANADIAN CONTENT

The following courses count as one course in the five required for the certificate program in Canadian Studies and in the eight required for the major in Canadian Studies. Independent studies may also be arranged with Canadian Studies faculty.

Economics

265. International Trade and Finance. *Kimbrough and Tower*

English

179S. Repairing the Continent: Canadian and United States Literary Perspectives. *A. Davidson*

186S.A. Canadian Literature in English. *A. Davidson*

288. Margaret Atwood. *A. Davidson*

French

131S. French in the New World. *Thomas*

169. The Contemporary Novel in French Canada. *Keineg*

Health Administration

Students interested in this area should consult the director of the Canadian Studies Program.

History

108C. Canadian-American Relations. *Thompson*

119A. Native American History. *Wood*

121B. The United States as a World Power: 1861-1940. *Davis*

166S. American Dreams / American Realities. *Wilson*

183S. Canada from the French Settlement. *Thompson*

195S.45. Canadian and American Agrarian Movements. *Thompson*

196S.24. Problems in Recent United States Diplomatic History. *Davis*

216S. United States Diplomacy, 1890-1945. *Davis*

Interdisciplinary Courses

98. Introduction to Canada. C-L: Economics 98, History 98, Political Science 98, and Sociology 98.

LeClerc or Thompson

182. Media in Comparative Perspective. C-L: Political Science 182 and Sociology 182. *J. Smith*

184S. Canadian Issues. C-L: Comparative Area Studies, Cultural Anthropology 184S, Economics 184S, History 184S, Political Science 184S, and Sociology 184S. *Staff*

282S. Canada: Research Seminar. C-L: Comparative Area Studies, Cultural Anthropology 282S, Economics 282S, History 282S, Political Science 282S, and Sociology 282S. *Staff*

Political Science

117. Comparative Government and Politics: Selected Countries. *Staff*

182. Media in Comparative Perspective. *J. Smith*

203S. Issues in Politics and the Media in the United States. *Paletz*

266S. Comparative Social Policy. *S. Smith*

277. Comparative Party Politics. *Lange*

Public Policy Studies

265S. The Process of International Negotiation. C-L: Political Science 265S. *Mayer*

Sociology

167. The Social Bases of Politics. *Gereffi or J. Smith*

171. Comparative Health Care Systems. *Maddox*

179. Modern Nationalist Movements. *Tiryakian*

182. Media in Comparative Perspective. *J. Smith*

222. The State and Communications Policy. *J. Smith*

255. Political Sociology. *J. Smith or Tiryakian*

THE CERTIFICATE

In the Canadian Studies Certificate Program, a student must take five courses with Canadian content. These must include Interdisciplinary Course 98, one upper-level seminar, and three other Canadian Studies courses. Students who do not have the equivalent of two years of college-level French are strongly encouraged to take French 21 and 22, Accelerated French.

THE MAJOR

Corequisite. Completion of another major.

Major Requirements. Eight courses in Canadian Studies. These must include Interdisciplinary Course 184S and seven other semester-course credits in courses on Canada, some of which may be fulfilled by independent study or special reading courses. No more than two courses required for the first major may be counted for a Canadian Studies major. To complete the major in Canadian Studies a student must also take at least two full years of college-level French, or must possess an equivalent competence in the language as certified by the Department of Romance Studies.

For further information, contact the Director, 2016 Campus Drive.

Cell Biology

For courses in cell biology, see Biology and Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates.

Chemistry (CHM)

Professor Baldwin, *Chair*; Professor Bonk, *Director of Undergraduate Studies and Supervisor of Freshman Instruction*; Professors Chesnut, Crumbliss, Fraser-Reid, Lochmüller, McGown, McPhail, Palmer, Pirrung, Porter, Shaw, Smith, and Wells; Associate Professors Henkens, and MacPhail; Assistant Professors Burk, Coury, Prisant, Toone, and Yang; Professors Emeriti Arnett, Bradsher, Hobbs, Poirier, Quin, Strobel, and Wilder; Adjunct Professors Ghirardelli and Spielvogel; Adjunct Associate Professors Chao and Sternbach; Adjunct Assistant Professor Andrews; Lecturers D'Silva and Woerner

A major is available in this department.

Courses with laboratories include fifty to sixty hours of laboratory work per term.

11L, 12L. Principles of Chemistry. (NS) The introductory course for students who intend to take additional chemistry courses other than Chemistry 83. 11L: emphasizes stoichiometry and atomic and molecular structures. 12L: emphasizes thermodynamics, chemical kinetics, synthesis, and analysis. Laboratory work includes both qualitative and quantitative analysis. Prerequisites: one year of high school chemistry or consent of instructor; Mathematics 19 or its equivalent; and for 12L: Chemistry 11L. One course each. *Bonk and staff*

19. General Chemistry. Credit for advanced placement on the basis of the College Board examination in chemistry. Equivalent to Chemistry 11L and 12L as prerequisite. One course.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

117. Inorganic Chemistry. (NS) Bonding, structures, and reactions of inorganic compounds studied through physical chemical concepts. Prerequisite: Chemistry 161 or 162L. One course. *Burk, Crumbliss, Palmer, or Wells*

131. Analytical Chemistry. (NS) Fundamentals of qualitative and quantitative measurement with emphasis on chemometrics, quantitative spectrometry, electrochemical methods, and common separation techniques. Corequisite: Chemistry 133L. Prerequisite: Chemistry 163L. One course. *Coury, Lochmüller, or McGown*

133L. Analytical Chemistry Laboratory. (NS) Laboratory experiments designed to accompany Chemistry 131. Corequisite: Chemistry 131. Half course. *Staff*

151L, 152L. Organic Chemistry. (NS) The structures and reactions of the compounds of carbon. Laboratory: techniques of separation, organic reactions and preparations, and systematic identification of compounds by their spectral and chemical properties. Prerequisite: Chemistry 12L, 23L, or 31S or consent of director of undergrad-

uate studies; for 152L: Chemistry 151L. One course each. *Baldwin, Fraser-Reid, Pirrung, Porter, or Toone*

161. Physical Chemistry. (NS) Fundamentals of theoretical chemistry with particular emphasis on chemical thermodynamics and kinetics. Chemistry 163L should be taken concurrently. Prerequisites: Chemistry 12L, Mathematics 32, and Physics 52L or 54L. One course. *Chesnut, Henkens, MacPhail, McPhail, Prisant, Smith, or Yang*

162L. Physical Chemistry. (NS) Fundamentals of theoretical chemistry with particular emphasis on quantum chemistry, molecular structure, and molecular spectroscopy. Laboratory. Prerequisite: Chemistry 12L, Physics 52L or 54L, Mathematics 103 or consent of instructor. One course. *Chesnut, Henkens, MacPhail, McPhail, Prisant, Smith, or Yang*

163L. Physical Chemistry Laboratory. (NS) Laboratory experiments designed to accompany Chemistry 161. Prerequisite: (or corequisite) Chemistry 161. Half course. *Staff*

176. Biophysical Chemistry. (NS) The physical chemical principles of and experimental methods employed in the study of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisite: Chemistry 161 or Biochemistry 227. One course. *Henkens or Shaw*

180L. Advanced Laboratory Techniques. (NS) Synthesis of less common substances by techniques such as high or low pressure, high or low temperature, and/or inert atmospheres. Characterization of products from measurements such as electrical conductance, optical rotation, ultraviolet-visible spectra, infrared spectra, and/or mass spectra. Prerequisite: (or corequisite) Chemistry 117. Half course. *Staff*

191, 192. Independent Study. Supervised reading and research. Half or one course. Consent of instructor required. Variable credit. *Staff*

193, 194. Independent Study. Supervised reading and research. Prerequisites: Chemistry 191, 192, and consent of independent study coordinator. One course each. *Staff*

195S, 198S. Seminar. (NS) Topics from various areas of chemistry, changing each year. For example: organic chemistry of biologically important compounds, chemical basis of pharmacology, metal ions in biological systems. Open to senior chemistry majors or by consent of instructor. One course each. *Staff*

196S. Seminar. (NS) Selected topics in physical chemistry of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisites: Chemistry 163L and 175 or Biochemistry 227. One course. *Henkens or Shaw*

For Seniors and Graduates

201. Molecular Spectroscopy. (NS) Selected spectroscopic methods in the study of molecular structure. Symmetry and group theoretical basis for selection rules, theories of magnetic and optical resonance, and interpretation of spectra; examples from both inorganic and organic chemistry. Three lectures. Open to especially well-prepared undergraduates by consent of director of undergraduate studies. One course. *Baldwin, Fraser-Reid, Palmer, Pirrung, Prisant, and Smith*

203. Quantum Chemistry. (NS) Basic principles of quantum and group theoretical methods. Topics include symmetry and a review of the fundamentals and the mathematical foundations of quantum theory. Emphasis on the application of molecular orbital theory to organic and inorganic systems. Open to especially well-prepared undergraduates by consent of director of undergraduate studies. Prerequisite: Chemistry 162L. One course. *Chesnut, MacPhail, and Porter*

205. Structure and Reaction Dynamics. (NS) Structure and mechanisms in organic and inorganic compounds, substitution reactions, linear free energy relations, and molecular rearrangements. Emphasis on the use of kinetic techniques to solve problems in reaction mechanisms. Three lectures. Open to especially well-prepared undergraduates by consent of director of undergraduate studies. One course. *Crumbliss, Porter, Toone, and Wells*

207. Principles of Kinetics, Thermodynamics, and Diffraction. (NS) Three lectures. Open to especially well-prepared undergraduates by consent of director of undergraduate studies. One course. *McPhail, Prisant, Smith, and Yang*

209. Advanced Chemistry. (NS) A combination of three one-third course segments from Chemistry 201, 203, 205, and 207. Interested students should consult the director of undergraduate studies for scheduling. Consent of director of undergraduate studies required. One course. *Staff*

275, 276. Advanced Studies. (NS) (1) Analytical chemistry, (2) inorganic chemistry, (3) organic chemistry, and (4) physical chemistry. Open to especially well-prepared undergraduates by consent of director of undergraduate studies. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

23L. Advanced General Chemistry. (NS)

31S. Advanced Chemical Fundamentals. (NS)

83. Chemistry and Society. (NS)

151M, 152M. Organic Chemistry. (NS)

175. Molecular Basis of Biological Processes. (NS)

197S. Seminar. (NS)

THE MAJOR

Differing major programs are offered under the baccalaureate degrees, including a new concentration in the area of biochemistry. The Bachelor of Arts degree programs permit greater flexibility in allowing students to select an area of concentration while satisfying the junior-senior small group learning experience requirements through seminar courses (option one) or through independent study in chemistry or related departments (option two). Of particular significance are the areas of emphasis (option three) including biology, mathematics, physics, materials science, and chemical engineering. The Bachelor of Science degree program, accredited by the American Chemical Society, provides in-depth preparation for graduate study in chemistry.

For the A.B. Degree

Prerequisites. Chemistry 11L, 12L; or Chemistry 19, 23L, or 31S. Mathematics 31, 32 (or 31L, 32L or 33, 34); Physics 51L, 52L (or 53L, 54L).

Major Requirements. Chemistry 131, 133L, 151L, 152L, and either 162L or 161 and 163L, plus one of the following options:

1. Two of the following: Chemistry 117, 162L,* 175 (or Biochemistry 227), 176, 195S, 196S, 198S.

*If Chemistry 162L is taken to fulfill the major requirement for physical chemistry, then 161/163L must be taken to fulfill the physical chemistry requirement of this option.

2. One of the following: Chemistry 117, 154L, 162L,* 175 (or Biochemistry 227); *plus* Chemistry 191, 192 or the equivalent in a natural science, mathematics, engineering, or a basic science department in the School of Medicine.
3. One of the following:
 - a. Physics emphasis. Chemistry 162L* *plus* two of the following: Physics 143L, Physics 181, Physics 182.
 - b. Mathematics emphasis. Chemistry 162L* *plus* two of the following: Mathematics 104, Mathematics 111, Mathematics 114L, Mathematics 131.
 - c. Biology emphasis. Biochemistry 227 *plus* two of the following: Biology 151, Biology 152, Biology 160, Biology 184L, Biology 244.
 - d. Materials science emphasis. One of the following: Chemistry 117, 162L,* Biochemistry 227; *plus* Engineering 83; *plus* one of the following: Engineering 101, Mechanical Engineering 113, Mechanical Engineering 208.
 - e. Chemical engineering emphasis. One of the following: Chemistry 117 or 162L,* Biochemistry 227; *plus* Engineering 75; *plus* one of the following: Engineering 123, Mechanical Engineering 126.

In certain cases, substitutions may be made for courses outside the chemistry department with consent of the director of undergraduate studies.

Recommendations. Computer Science 8 or Engineering 51, Mathematics 103 (for options one and two), and Chemistry 162L. Students planning graduate study are advised to take these recommended courses and to consult with advisors regarding appropriate additional courses.

For the B.S. Degree

Prerequisites. Chemistry 11L, 12L; or Chemistry 19, 23L, or 31S. Mathematics 31, 32 (or 31L, 32L or 41); 103; and Physics 51L, 52L (or 53L, 54L).

Major Requirements. Chemistry 117, 131, 133L, 151L, 152L, 161, 162L, 163L, 180L, *plus* three or four additional courses selected according to option 1, 2, or 3.

1. Three chemistry courses selected as follows.
Chemistry 191, 192.
Plus: Chemistry 176, 195S, 196S, 198S, 201, 203, 205, 207, 209, 275 or 276.
2. Two chemistry courses *plus* one approved course in another department selected as follows.
At least 1 of the following: Chemistry 191 or 192.
Plus: Chemistry 176, 195S, 196S, 198S, 201, 203, 205, 207, 209, 275 or 276.
Plus: One lecture course in an approved science department in Trinity College, basic science of the School of Medicine, or in the School of Engineering.
3. Two chemistry courses *plus* two independent study courses in an approved department selected as follows.
At least two of the following: Chemistry 176, 191, 195S, 196S, 198S, 201, 203, 205, 207, 209, 275 or 276.
Plus: Two approved independent study courses in a science department in Trinity College, basic sciences of the School of Medicine, or in the School of Engineering.

Chemistry 201, 203, 205, and 207 are offered also in one-third semester segments; in some instances a student may wish to take some combination of three of these segments

*If Chemistry 162L is taken to fulfill the major requirement for physical chemistry, then 161/163L must be taken to fulfill the physical chemistry chemistry requirement of this option.

by registering for Chemistry 209. Additional details may be obtained from the director of undergraduate studies.

Recommendations. Mathematics 104 and Physics 100. Students planning graduate study in chemistry should consult with advisors regarding appropriate additional courses.

The Concentration in Biochemistry

In cooperation with the Department of Biochemistry in the School of Medicine, the Chemistry Department offers both an A.B. and a B.S. degree in chemistry with concentration in biochemistry. Certification of this concentration is designated on the official transcript.

For the A.B. Degree with Concentration in Biochemistry

Prerequisite: Chemistry 11L, 12L (or 19, 23L, or 31S); Mathematics 31, 32 (or 31L, 32L or 41); Physics 51L, 52L (or 53L, 54L); and Biology 21L, 22L.

Major Requirements. Chemistry 131/133L, 151L, 152L, 161/163L; Biochemistry 227, 228; plus one of the following: Chemistry 176, 191, 195S, 198S; Biology 160, 180, 184L, 191; or any advanced course in biochemistry.

For the B.S. Degree with Concentration in Biochemistry

Prerequisites. Chemistry 11L, 12L (or 19, 23L, or 31S). Mathematics 31, 32 (or 31L, 32L or 41); Physics 51L, 52L (or 53L, 54L); and Biology 21L, 22L.

Major Requirements. Chemistry 117, 131/133L, 151L, 152L, 161/163L, either 176 or 162L; Biochemistry 227, 228; Biology 160 or 180, plus one of the following: Chemistry 191, Biology 191, or Biochemistry 209.

Recommendations. Chemistry 180L, 192, 195S, 198S; Biology 184L, 192; advanced courses in biochemistry.

Honors/Distinction

The department offers a program for graduation with distinction in chemistry. See the section on honors in this bulletin. The program involves two semesters of independent study, taken either in the chemistry department (Chemistry 191, 192) or, with the prior approval of the coordinator of independent study, in an appropriate science department in Trinity College, the School of Engineering, or the School of Medicine. A research paper based upon the independent study and nomination by the research supervisor form the basis for consideration by a departmental committee. The committee may recommend the student for graduation with distinction in chemistry. The department also offers Latin honors by honors project. (See general description in the bulletin.)

Entrance requirements: 3.3 Duke grade point average and at least a 3.4 grade point average in the major at the beginning and end of the project.

Entrance procedures: Student fills out an application form and submits it to the director of undergraduate studies in chemistry.

Time of application: Two semesters prior to graduation.

Supervision: A faculty member in chemistry who is supervising the student's independent study project in Chemistry 191, 192.

Courses, credit: Chemistry 191, 192 and at least five courses selected from Chemistry 117, 151L, 152L, 161/163L, 131/133L, 162L, 209, 275, and 276.

Project: Same project which is the subject of the student's independent study in chemistry 191, 192. The student must fulfill the four requirements of Chemistry 191, 192: participation in an orientation program, one oral presentation of the project, submission of a paper describing the research accom-

plished, and participation in the department's annual undergraduate research poster session.

Grade point average criteria: *Cum laude* (minimum cumulative grade point average of 3.3 and a minimum grade point average of 3.4 in the chemistry major), *magna cum laude* (minimum cumulative Duke grade point average of 3.4 and minimum grade point average of 3.7 in the chemistry major), and *summa cum laude* (minimum cumulative Duke grade point average of 3.7 and a minimum grade point average of 3.9 in the chemistry major).

Evaluation: By the Honors and Awards Committee of the Chemistry Department with a majority vote for honors.

Chinese

For courses in Chinese, see Asian and African Languages and Literature.

Classical Studies (CS)

Professor Clay, *Chair*; Associate Professor Burian, *Director of Undergraduate Studies*; Professors Connor, Davis, Newton, Oates, Stanley, and Younger; Associate Professors Boatwright and Rigsby; Assistant Professor Janan; Professors Emeriti Richardson and Willis; Adjunct Assistant Professor Cormack; Senior Lecturing Fellow Zarker

Majors are available in this department.

The objective of classical studies is to increase knowledge and understanding of the roots of Western culture in the civilizations of Greece and Rome. Toward this aim, the department offers courses in three areas (Latin, Greek, and classical studies) and two majors (classical studies, classical languages). Concentration in the languages offers students training in exploring at first hand the literature, history, and thought of antiquity. In the process, students will gain a deeper insight into language itself, as well as an appreciation of the problems of interpretation and the varieties of evidence upon which interpretation may be based. For students interested in history, ancient art, or archaeology, courses in classical studies offer a means of assessing the culture and the material remains of Greece and Rome in their own rich and varied context.

A secondary aim is, and has been by a centuries-old tradition, the development of a keener perception and understanding of the cultural forces at work in the contemporary world. As a result, the field of classical studies is an excellent foundation for advanced work in other academic disciplines as well as in professional programs in law, medicine, and finance.

GREEK (GRK)

1-2. Elementary Greek. (FL) A study of grammar and an introduction to reading. Two courses. *Staff*

14S. Intensive Elementary Greek. (FL) Introduction to the grammar, offered only in the summer; combining the work of Greek 1 and 2 in one course. Two courses. *Staff*

15S. Intensive Intermediate Greek. (FL) Combining the work of Greek 63 and 64 in one course, offered only in the summer; selected readings in prose and poetry. Two courses. *Staff*

63, 64. Intermediate Greek. (FL) Introduction to Greek prose and poetry. 63: Plato's *Republic*, *Apology*, or *Symposium*. 64: Euripides and Homer. One course each. *Burian, Clay, or Stanley*

200. Readings in Greek Literature. (AL, FL) One course. *Staff*

203. Homer. (AL, FL) Problems of language and structure in the *Iliad*; present state of Homeric scholarship. One course. *Burian or Stanley*

205. Greek Lyric Poets. (AL, FL) Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. One course. *Burian or Stanley*

207. The Dramatists. (AL, FL) Readings and studies of selected plays by the major playwrights Aeschylus, Sophocles, Euripides, and Aristophanes. One course. *Burian*

222. The Historians. (AL, FL) Readings and studies in the major Greek historians Herodotus, Thucydides, and Xenophon. One course. *Connor or Oates*

Courses offered each year on demand in consultation with the Director of Undergraduate Studies:

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. Half or one course. Variable credit. *Staff*

193, 194. Honors Research in Greek. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

217T. Greek Prose Composition. (FL) The course content is determined by the needs of the students enrolled. One course. *Staff*

Courses Currently Unscheduled

103S, 104S. Studies in Greek Literature. (AL, FL)

209. Introduction to Hellenistic Literature. (AL, FL)

210. Alexandrian Poetry. (AL, FL)

226. The Orators. (AL, FL)

LATIN (LAT)

1-2. Elementary Latin. (FL) Study of the structure of the language (forms, vocabulary, syntax, and pronunciation); selected readings in prose and poetry. Two courses. *Staff*

14S. Intensive Elementary Latin. (FL) Introduction to the grammar, offered only in the summer; combining the work of Latin 1 and 2 in one course. Two courses. *Staff*

15S. Intensive Intermediate Latin. (FL) Combining the work of Latin 63 and 64 in one course, offered only in the summer; selected readings in prose and poetry. Two courses. *Staff*

63, 64. Intermediate Latin. (FL) Introduction to Latin prose and poetry. 63: selected prose, including Caesar. 64: three books of Vergil's *Aeneid*. One course each. *Boatwright, Davis, or Zarker*

100. Introduction to Literature. This number represents course credit for a score of 4 or 5 on one or more of the College Board Advanced Placement tests in Latin. One course.

101. Advanced Latin. (AL, FL) Transition course for freshmen and sophomores from high school to college Latin. Review of grammar; readings in prose and poetry. Prerequisites: achievement score of 640 and above, or a College Board Advanced Placement score of 4 or 5 in Latin. One course. *Clay*

103S, 104S. Studies in Latin Literature. (AL, FL) 103S: the Late Republic, including Catullus and Cicero. 104S: the Age of Augustus, including Horace and Livy. One course each. *Davis, Janan, or Stanley*

105S. Ovid: *The Metamorphoses*. (AL, FL) The poem studied as representative of Ovid's varied narrative art, as the largest-scale Roman treatment of classical myths, and as Ovid's statement on Augustanism. One course. *Davis, Janan, or Newton*

107S. Vergil's *Aeneid*. (AL, FL) Reading and analysis of the *Aeneid*, with particular attention to stylistics and historical setting. One course. *Davis or Newton*

108S. Lyric and Occasional Poetry. (AL, FL) Readings in the works of Catullus, Horace, and Martial. One course. *Davis, Janan, or Newton*

111S. Elegiac Poets. (AL, FL) The traditions of Latin love elegy and its development in Propertius, Tibullus, and Ovid. One course. *Davis or Janan*

112S. Roman Comedy. (AL, FL) Representative plays of Plautus and Terence with lectures on the genre and its Greek forebears. One course. *Richardson*

116S. Lucretius. (AL, FL) The *De Rerum Natura* studied as poetry and philosophical thought. One course. *Clay or Newton*

170. Special Topics in Latin Literature. (AL, FL) Prerequisite: Latin 64 or 104S, depending on the topic. One course. *Staff*

200. Readings in Latin Literature. (AL, FL) One course. *Staff*

205. The Roman Novel. (AL, FL) Readings in Petronius and Apuleius. One course. *Davis, Richardson, or Stanley*

206S. Cicero. (AL, FL) One course. *Richardson*

207S. Vergil's *Aeneid*. (AL, FL) Intensive analysis of all of Vergil's *Aeneid*, focusing on text and historical context, complemented by research papers and reports. Not open to students who have taken Latin 107S. One course. *Davis or Newton*

208S. Lyric and Occasional Poetry. (AL, FL) Readings in the works of Catullus, Horace, and Martial. Same as 108S, except additional term paper required. One course. *Davis, Janan, or Newton*

211S. Elegiac Poets. (AL, FL) Analysis of most of the *corpora* of Propertius, Tibullus, and Ovid with close attention to the stylistics of the poems, their place in the traditions of Latin love elegy, and their relation to other phenomena of the Augustan period. Not open to students who have taken Latin 111S. One course. *Davis, Janan, or Richardson*

214S. The Historians. (AL, FL) Investigations of the Romans' conceptions and practices of writing history, based on detailed analysis of the works of Sallust, Livy, and Tacitus. Additional readings in the fragments of other Latin historians, and in comparative Greek historians. Not open to students who have taken Latin 114S. One course. *Boatwright or Richardson*

221. Medieval Latin. (AL, FL) Selected works of the Latin Middle Ages from Prudentius to the humanists. Genres studied usually include the hymn, sequence, drama, lyric, saints' lives, chronicle, epic, and epistle. C-L: Medieval and Renaissance Studies. One course. *Newton*

Courses offered each year on demand in consultation with the director of undergraduate studies.

191, 192. Independent Study. Directed reading and research. Open to qualified juniors and seniors. Half or one course. Variable credit. *Staff*

193, 194. Honors Research in Latin. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

217T. Latin Prose Composition. (FL) The course content is determined by the needs of the students enrolled. One course. *Staff*

Courses Currently Unscheduled

106S. Roman Satire. (AL, FL)

204. Epic of the Silver Age. (AL, FL)

CLASSICAL STUDIES (CS)

11S. Greek Civilization. (CZ) The culture of the ancient Greeks from the Bronze Age to Alexander the Great: art, literature, history, philosophy, and religion. One course. *Staff*

12S. Roman Civilization. (CZ) The culture of ancient Romans from their beginnings to Constantine: art, literature, history, philosophy, and religion. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

53. Greek History. (CZ) The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. C-L: History 53. One course. *Oates*

54. Roman History. (CZ) The Roman Republic and Empire to the Late Antique. C-L: History 54. One course. *Boatwright or Oates*

95. Principles of Archaeology. (CZ) Introduction to the many disciplines of archaeology, including a history of the subject, excavation techniques, surveying, creating stylistic typologies, mechanical drawing, and the interpretation of archaeological evidence. One course. *Younger*

99. Perspectives in Archaeology. (CZ) See C-L: Religion 99; also C-L: Interdisciplinary Course 99 and Judaic Studies. One course. *C. Meyers, E. Meyers, Younger, and staff*

100. History of Ancient Philosophy. (CZ) Not open to students who have taken Classical Studies 93 or Philosophy 93. Prerequisites: for first-year students, previous philosophy course and consent of instructor. See C-L: Philosophy 100. One course. *Ferejohn or Mahoney*

101. Science and Technology in the Ancient World. (CZ) Technical innovation and scientific thought in the ancient Near East, Greece, and Rome. C-L: History 178A. One course. *Rigsby*

103. Religion in Greece and Rome. (CZ) Religious thought, rituals, and institutions from Homer to late antiquity. One course. *Rigsby*

104S. Women in the Ancient World. (CZ) The perception and reality of the roles, functions, and status of women from the time of Homer to late antiquity. C-L: History 126S and Women's Studies. One course. *Boatwright*

105. Ancient and Medieval Epic. (AL) Reading in translation of major epics from antiquity (*Gilgamesh*, Homer's *Iliad* and *Odyssey*, Vergil's *Aeneid*) and the European Middle Ages (*Beowulf*, *Song of Roland*, Dante's *Inferno*), with emphasis on definition and critique of changing conceptions of the hero. One course. *Burian or Davis*

106. Drama of Greece and Rome. (AL) Reading in translation of selected tragedies (Aeschylus, Sophocles, Euripides, Seneca) and comedies (Aristophanes, Menander, Plautus, Terence) with emphasis on contemporary theatrical practice, political, social,

and cultural developments, and influence on later European drama. C-L: Drama 155. One course. *Burian or Clay*

113. Aristotle. (CZ) See C-L: Philosophy 123. One course. *Ferejohn*

115. The Classical Tradition. (AL) The notion of the "classical" from the creation of the archetype to the present. One course. *Burian*

116S. The Pagan World of the Divine Comedy. (AL) See C-L: Distinguished Professor Course 190S; also C-L: Medieval and Renaissance Studies. One course. *Clay*

117. Ancient Myth in Literature. (AL) Myth in classical and medieval writers from Hesiod to Boccaccio. C-L: Medieval and Renaissance Studies. One course. *Davis or Newton*

123. Greek Art and Archaeology I. (AL) Greek architecture, sculpture, and painting from the Bronze Age through the Classical period. C-L: Art 123. One course. *Younger*

124. Greek Art and Archaeology II. (AL) Architecture, sculpture, painting, and mosaics from the Classical period through the Greco-Roman period. C-L: Art 124. One course. *Younger*

128. Art of the Roman Empire. (AL) See C-L: Art 128. One course. *Cormack*

130. Late Antique Christian Art. (AL) See C-L: Art 130; also C-L: Religion 130. One course. *Wharton*

131. Art of the Early Middle Ages. (AL) See C-L: Art 131; also C-L: Medieval and Renaissance Studies. One course. *Tronzo or Wharton*

139. Aspects of Medieval Culture. (CZ) See C-L: Medieval and Renaissance Studies 114; also C-L: History 116. One course. *Aers, Solterer, or Witt*

144. Roman Architecture. (AL) See C-L: Art 126B. One course. *Cormack*

145. Rome: History of the City. (CZ) The development of the urban plan and its major monuments through the ages; the influence of the ancient Republic and Empire, the Papacy, and the modern secular state; change and continuity in artistic forms and daily life. (Taught on site in Italy in summer.) C-L: Art 126A. One course. *Staff*

147. Ancient Greece. (CZ) On-site study of the cultures in Greece from Neolithic to Medieval, concentrating on Athens, the Peloponnese, Crete, and the Cyclades. Summer program in Greece. Prerequisite: Classical Studies 11S, 53, 123, or 124, or History 53, or consent of instructor. C-L: Art 115. One course. *Younger*

180. Special Topics in Classical Studies. Topics to be announced. One course. *Staff*

195S, 196S. Junior-Senior Seminars in Classical Studies. (CZ) Specific aspects of the history, art, and literature of classical Greece and Rome. Open only to qualified juniors and seniors; some knowledge of classical studies and history desirable, but not strictly necessary. One course each. *Staff*

203. Ancient Political Philosophy. (SS) See C-L: Political Science 223. One course. *Gillespie or Grant*

211S. Plato. (CZ) Selected dialogues. C-L: Philosophy 211S. One course. *Ferejohn*

217S. Aristotle. (CZ) Selected topics. C-L: Philosophy 217S. One course. *Ferejohn*

220S. Topics in Greek Art. (AL) Consent of instructor required. See C-L: Art 201S. One course. *Cormack*

222. Fifth and Fourth Century Greece. (CZ) From the Persian Wars to the dominance of Philip of Macedon. C-L: History 260. One course. *Oates or Rigsby*

224. The Roman Republic. (CZ) The rise of Rome, to its mastery of the Mediterranean; the political, social, and intellectual consequences. C-L: History 263. One course. *Boatwright or Rigsby*

225. The Roman Empire. (CZ) The foundation, consolidation, and transformation of Roman rule from Augustus to Diocletian. C-L: History 264. One course. *Boatwright*

227S. Topics in Roman Art. (AL) Consent of instructor required. See C-L: Art 202S. One course. *Cormack*

230S. Topics in Early Christian and Byzantine Art. (AL) Consent of instructor required. See C-L: Art 233S; also C-L: Medieval and Renaissance Studies and Religion 275S. One course. *Wharton*

231S. Greek Sculpture. (AL) Free standing, relief, and architectural sculpture from the archaic period to the Hellenistic age, representing changing aesthetic, social, and political aims. C-L: Art 238S. One course. *Younger*

232S. Greek Painting. (AL) From the Late Bronze Age to the fourth century B.C., with emphasis on archaic and classical Athenian vase painters. C-L: Art 237S. One course. *Stanley*

258. The Hellenistic and Roman East. (CZ) The social and cultural history of the Greco-Roman world, concentrating on papyrological evidence. Prerequisites: knowledge of ancient Greek and Latin. One course. *Oates*

Courses offered each year on demand in consultation with the director of undergraduate studies.

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. One course each. *Staff*

193, 194. Honors Research in Classical Studies. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

Courses Currently Unscheduled

70. The Age of Augustus. (CZ)

102. History of Greek and Roman Civil Law. (CZ)

114D. Hellenistic Philosophy. (CZ)

129. The Age of Justinian. (AL)

135. Alexander the Great. (CZ)

137. Roman and Non-Roman in Ancient Italy. (CZ)

155. The Aegean Bronze Age. (CZ)

161S. Athens. (CZ)

162. Pompeii. (CZ)

171. Ancient Cosmology. (CZ)

221. Archaic Greece. (CZ)

223. Alexander and the Hellenistic World. (CZ)

226. Late Antiquity. (CZ)

233S. Greek Architecture. (AL)

235S. Roman Architecture. (AL)

236S. Roman Painting. (AL)

THE MAJOR

Students may choose first or second majors in classical studies (ancient history, archaeology, literature in translation or in the original) or in classical languages (a third-year reading level in either Latin or Greek and a second-year reading level in the other ancient language, with additional course work in classical civilization).

Students who contemplate graduate work in classical studies or in the ancient languages Greek and Latin are reminded of the necessity for competence in both these languages (usually at least three years of the one and two of the other) and an eventual reading knowledge of French and German for all higher degrees.

Prospective majors in classical languages are urged to consult with the director of undergraduate studies at the earliest feasible time, preferably by the sophomore year.

Majors are eligible for nomination to one semester during their junior year at the Intercollegiate Center for Classical Studies in Rome, of which Duke University is a founding member, or at the College Year in Athens, at a cost comparable to that of a semester at Duke. Financial assistance at Duke can usually be transferred, and arrangements are made through the university. Courses in Greek, Latin, ancient history, and archaeology taken in these programs are counted toward the major requirements. For further information, see the section on study abroad.

Classical Studies (Literature, Ancient History, Civilization, or Archaeology)

Prerequisites. Classical Studies 11S or 53, and Classical Studies 12S or 54.

Major Requirements. Seven classical studies courses above the level of Classical Studies 60, including Classical Studies 195S or 196S; at least two courses must be in separate areas (literature in translation or above the level of Greek/Latin 64; history, or art and archaeology).

Related Work. The department urges all classical studies majors to fulfill the university foreign language area of knowledge.

Classical Languages (Greek and Latin)

Major Requirements. Both ancient languages, Greek and Latin, one to a full third-year reading level (the equivalent of Greek or Latin 104), and at least four college courses in the other (at least the equivalent of Greek or Latin 64). And two classical studies courses, including Classical Studies 195S or 196S, in separate areas (literature in translation; history, or art and archaeology).

Related Work. The department urges all classical languages majors to acquire some reading knowledge of French and German.

Honors/Distinction

The department offers work leading to graduation with distinction and to graduation with Latin honors by honors project. See the section on honors in this bulletin and the departmental director of undergraduate studies.

Comparative Area Studies Program (CST)

Professor Lawrence, *Director*

A major is available in this program.

The undergraduate major in comparative area studies offers a Bachelor of Arts degree to students interested in the interdisciplinary study of societies and cultures of a particular region of the world. Students complement their study with a concentration in a second world area and the comparative study of international themes or problems. The major allows a student to combine language study with courses in a variety of disciplines. As in area studies programs elsewhere, the result is a sustained focus on a single world area tailored to fit the student's interest. Comparative area studies at Duke, however, is distinct from other area studies programs in several respects. The primary concentration encourages study of language, literature, religion, and art of the chosen area as well as analysis of its social, historical, and political roots and problems. The secondary concentration imparts breadth of focus and a cross-regional perspective to the course of study, while the required course on comparative methods ensures an analytic perspective that is multidisciplinary as well as global.

Students in the program are currently studying Latin America, North America, Africa, the Middle East, Russia, South Asia, East Asia, and Eastern and Western Europe. Many comparative area studies majors double-major in comparative area studies and in such fields as art history, cultural anthropology, history, political science, Spanish, and French. Although the program provides all students with a solid background in liberal arts, it is specifically designed for those with career objectives in academia, government (especially the Foreign Service), international business, international law, health and environmental programs, the United Nations and international agencies and private international religious or service organizations.

The major draws its offerings from courses taught by over 130 Duke professors in fourteen cooperating departments. Interdisciplinary and intercultural courses have been designed specifically for majors in the program to help place those societies chosen for specialization in a broad comparative and global perspective. These courses stress the interrelationship of developed and underdeveloped societies and probe the difficulties and advantages of comparative, interdisciplinary, and intercultural research. The program is administered by its director and an advisory committee representing the various areas and cooperating departments.

Advising: Students must identify the area of their primary concentration. Faculty members with expertise in each area are available to provide advice concerning selection of an area and appropriate course work in the major. Selection of area is normally done by the end of the sophomore year. The program tries to foster close relationships between faculty and students working in similar areas.

Study Abroad or on Another Campus: The program encourages qualified and interested students to engage in sustained study abroad in their chosen area for a semester or for an academic year. Up to three courses taken in a non-Duke semester abroad program may be counted toward the requirements in the major. Duke students are eligible for a variety of programs now operating in Africa, Asia, Canada, Latin America, Russia, and Eastern and Western Europe. Students can also take advantage of a special service study in Washington, and internship programs with international agencies. Occasionally summer internships become available for qualified students.

Grants and Awards: At the initiative of the Center for International Studies, a program of grants and awards for majors has been instituted. A competition is held in the fall to select a small group of upperclass majors to organize a scholarly symposium on a comparative/global issue during the spring semester. Summer stipends for travel and research abroad are also offered to selected rising senior majors planning to enroll in the honors seminar. The author of the best research paper submitted to the honors seminar is recognized by an award for excellence in comparative analysis.

The courses listed on the following pages meet requirements for the major as introductory courses, area courses, and comparative/global issue courses. Basic language courses and courses at the 100 and 200 level taught in the foreign language satisfy the foreign language corequisite; such courses are not listed. Only advanced language

and literature courses meeting requirements for specific areas of the major are listed below. Selected non-listed upper level and seminar courses offered by various departments and programs (including Comparative Area Studies 140 and Comparative Area Studies 200S), the topics of which vary from semester to semester, may also be included if the topics covered fall within a particular area or focus on comparative/global issues. To determine if specific courses meet requirements for the major, consult the director. To meet the general studies requirement of Program I, courses in the major from only two areas of knowledge may be counted. For a complete description of each course, including cross-listings, consult the listing in the Duke University bulletin under the appropriate department or under Interdisciplinary Courses.

COMPARATIVE AREA STUDIES COURSES

109. Contemporary Global Issues. (SS) Nature of important global phenomena and conditions and their manifestations in diverse regions and societies. Includes such questions as what is progress? Are nation-states obsolete? How are we managing an interdependent world economy and a fragile global environment? C-L: Cultural Anthropology 109, History 109, Political Science 160, and Sociology 175. One course. *Staff*

110. Global Human Geography. (SS) World development and modernization through the lenses of geography. Patterns of adaptation by peoples and societies to different physical environments and the changing world economy. One course. *Staff*

125. Comparative Approaches to Global Issues. (SS) Comparative research and analysis in the social sciences and the humanities: strengths and weaknesses of cross-cultural comparison as developed by sociologists, historians, political scientists, anthropologists, and specialists in comparative literature and religion. C-L: Cultural Anthropology 125, History 137, Political Science 125, Religion 121, and Sociology 125. One course. *Staff*

140. Selected Topics in Comparative Area Studies. Topics vary from semester to semester, focusing either on specific world regions or particular comparative/global issues. One course. *Staff*

150S. Comparative Area Studies Honors Seminar. (CZ) Open to seniors majoring in Comparative Area Studies. Consent of instructor required. One course. *Staff*

200S. Advanced Topics in Comparative Area Studies. Topics vary, focusing either on specific world regions or particular comparative/global issues. One course. *Staff*

INTRODUCTORY COURSES

Comparative Area Studies 109. Contemporary Global Issues. *Staff*
 Comparative Area Studies 110. Global Human Geography. *Staff*
 Cultural Anthropology 94. Introduction to Cultural Anthropology. *Staff*
 History 75, 76. The Third World and the West. *Ewald, Gordon, or Little*
 Literature 101. Introduction to the Study of Literature and Society. *Willis*
 Music 136S. Introduction to World Music. *Staff*
 Political Science 92. Comparative Politics. *Staff*
 Religion 45. Religions of Asia. *Cornell or Lawrence*

COMPARATIVE/GLOBAL ISSUES COURSES

Art and Art History

168. Art since 1945. *Cernuschi or Stiles*
 169. Documentary Photography and Social Activism in the Nuclear Age. *Stiles*
 179. The History of Performance Art. *Stiles*
 244A,S. International Expressionism. *Cernuschi and Rolleston*

Asian and African Languages and Literature

121. Introduction to Asian and African Literature. *Staff*
 190. Women in Islam. *Cooke*

Cultural Anthropology

- 100. Foundations of Cultural Anthropology. *Staff*
- 119. Language, Culture, and Society. *Apte, O'Barr, or Strauss*
- 126. Muslim World: Transformations and Continuities. *Ewing*
- 142. Sexuality in Global Perspective. *Luttrell*

Economics

- 140. Comparative Economic Systems. *Trembl*
- 219S. Economic Problems of Underdeveloped Areas. *Kelley or Wallace*
- 240. Comparative Economic Systems. *Trembl*
- 286S. Economic Policy-Making in Developing Countries. *Conrad or Ramachandran*

History

- 101C. Terrorism, 1848-1968. *M. Miller*
- 112A. The World in the Twentieth Century, 1900-1945. *Cell*
- 112B. The World in the Twentieth Century, 1945 to the Present. *Cell*
- 114B. Immigration, Migration, and Mobility of Labor: United States and the World. *Keyssar*
- 120. History of Socialism and Communism. *Lerner*
- 123S. Madness and Society in Historical Perspective. *M. Miller*
- 132. Modern World Environmental History, 1500 to the Present. *Richards*
- 158A. New Perspectives on the Atlantic World. *Ewald*
- 167S. United States and Canadian Constitutional Issues. *Staff*
- 168S. The Atlantic Slave Trade. *Gaspar*
- 195S.18. The Destruction and Aftermath of Slavery in the Americas: A Comparative Perspective. *J. Scott*
- 195S.36. Women, Family, and State. *Y. Miller*
- 195S.40. Fugitive Slave (Maroon) Communities in New World Slave Societies. *Gaspar*
- 195S.45. Canadian and American Agrarian Movements. *Thompson*
- 225S. Problems in Comparative Labor History. *French, Gordon, or Keyssar*
- 233S. Slave Resistance and Social Control in New World Societies. *Gaspar*
- 239S. History of Socialism and Communism. *Lerner*

Interdisciplinary Courses

- 120A. Perspectives on Food and Hunger. *Johns*
- 120B. Perspectives on Food and Hunger. *Johns*

Literature

- 135. National Identity. *Hell, Kaplan, Longino, and/or Stewart*
- 136. Autobiography across Cultures. *Kaplan or Willis*
- 151. Special Topics in Women Writers of the World. *Staff*
- 152. Special Topics in Regional Literatures of the Western World. *Staff*
- 157. International Popular Culture. *C. Davidson, Gaines, Radway, or Willis*
- 185. Psychoanalysis, Literature, and Film. *Gaines*
- 198. Censorship, Law, and Literature. *Staff*

Political Science

- 100K.01. Anglo-American Constitutionalism, Law, and Legal Institutions. (Taught in England.) *Staff*
- 100L.02. Law and Liability: Personal Injury in Britain and the United States. (Taught in England.) *Staff*
- 100N.02. The United States and Western Europe. (Taught in Brussels.) *Grieco*
- 107. Environmental Politics and Policies in the Industrial World. *McKean*
- 147. International Environmental Politics and Policies. *McKean or Miranda*
- 148D. Environmental Politics Beyond Borders. *McKean*
- 153, 154. Politics and the Media of Mass Communication. *Paletz*
- 155. The Politics and Economics of Developing Areas. *Staff*
- 173S. Political Economy of World Food Problems. *Johns*
- 231S. Crisis, Choice, and Change in Advanced Democratic States. *Kitschelt*
- 234S. Political Economy of Development: Theories of Change in the Third World. *Staff*
- 262S. International Communism. *Hough*
- 277. Comparative Party Politics. *Lange*
- 279S. Political Protest and Collective Mobilization. *Kitschelt*

Public Policy Studies

- 179S. Refugees and World Politics. *Boothby*
- 264S.57. Technology and Development. *Ramachandran*
- 266S. Comparative Social Policy. *Smith*
- 284S. Public Policy Process in Developing Countries. *Ascher*
- 286S. Economic Policy-Making in Developing Countries. *Conrad or Ramachandran*

Religion

- 103. Islam on the Pacific Rim. *Cornell*
- 112. Muslim Minorities in Society: From Asia to America. *Cornell and Lawrence*
- 113. Liberation Theologies in Asia, Africa, and Latin America. *Staff*

Russian

- 155. The Interaction of Russian and American Culture. *Lahusen and Van Tuyt*

Sociology

- 110E. Comparative Sociology: Cross-Regional. *Gereffi*
- 118. Sex, Gender, and Society. *O'Rand*
- 126. Third World Development. *Gereffi or Parnell*
- 142. Organizations and Global Competitiveness. *Gereffi*
- 143. Management and Labor Relations. *Gereffi, Janoski, or Thornton*
- 170. Mass Communication. *Smith*
- 171. Comparative Health Care Systems. *Boychuk*
- 179. Modern Nationalist Movements. *Tiryakian*
- 182. Media in Comparative Perspective. *Smith*
- 195S. Process of Globalization. *Tiryakian*
- 214. Comparative and Historical Methods. *Gereffi, Janoski, Lin, Smith, or Tiryakian*
- 222S, B. Proseminars in Comparative and Historical Sociology: Globalization and Comparative Development. *Gereffi, Lin, Simpson, Smith, or Tiryakian*
- 222S, D. Proseminars in Comparative and Historical Sociology: Culture, Values, and Ideas. *rical Gereffi, Lin, Simpson, Smith, or Tiryakian*
- 227S, C. Proseminar in Medical Sociology: Organization and Financing of Health Care. *George, Gold, Jackson, Lin, Maddox, Thornton, or Weinberger*

AREA COURSES: AFRICA

Art and Art History

- 173. Art, Architecture and Masquerade in Africa. *Powell*
- 174. Art and Philosophy from West Africa to the Black Americas. *Powell*

Cultural Anthropology

- 122. Culture and Politics in Africa. *Piot*

French

- 168. Francophone Literature. *Mudimbe-Boyi*

History

- 115. History of Africa. *Ewald*
- 168S. The Atlantic Slave Trade. *Gaspar*
- 179. History of South Africa, 1600-1960. *Ewald*
- 195S.23. Issues in the History of Tropical Africa. *Ewald*

Political Science

- 100C.01. Politics and Literature in Southern Africa. (Taught in Africa.) *Johns*
- 100C.02. Issues of Development in Botswana and Zimbabwe. (Taught in Africa.) *Johns*
- 171. Politics of South African Apartheid. *Johns*

Religion

- 164. History and Religions of North Africa. *Cornell*

Sociology

- 110A. Comparative Sociology: Selected Areas (Africa). *Gao, Gereffi, Janoski, Lin, Myers, Smith, or Tiryakian*

AREA COURSES: EAST ASIA

Art and Art History

- 164. Early Chinese Art and Archaeology. *Abe*
- 170. Chinese Buddhist Art and Architecture. *Abe*
- 171. Chinese Painting. *Abe*
- 172. Topics in Oriental Art. *Abe*
- 272S. Topics in Chinese Art. *Abe*

Asian and African Languages and Literature

- 141S. The Fantastic in Chinese Fiction in Translation. *Wang*
- 148S. Literature and Revolution: From the May Fourth to the Post-Mao Era. *Wang*
- 162. Modern Japanese Fiction in Translation. *Ching*
- 165S. Modern Arabic Literature in Translation. *Staff*

170. *The I Ching, or Book of Changes*. *Staff*
 182S. *The Forbidden Books: Issues of Censorship in China*. *Wang*

Chinese

- 141S. *The Fantastic in Chinese Fiction in Translation*. *Wang*
 171. *The Chinese Novel: The Dream of the Red Chamber*. *Wang*
 183, 184. *Topics in Modern Chinese*. *Staff*
 Additional Chinese courses are taught in Beijing and Nanjing as part of the Duke Study in China Program.

Cultural Anthropology

121. *Culture and Politics in China*. *Litzinger*
 163. *Foundations of Chinese Civilization*. (Taught in China.) *Staff*

Economics

- 134/234. *Japanese Economy and Its History*. *Bronfenbrenner*
 142S/242S. *Chinese Economy in Transition*. *Yang*

History

- 100J. *Foundations of Chinese Civilization*. (Taught in China.) *Staff*
 101K. *Topics in Chinese Civilization*. *Dirlik*
 101M. *Asian-Pacific Region in Historical Perspective*. *Dirlik*
 142A. *China: Roots of Revolution*. *Dirlik or Mazumdar*
 142B. *China since 1949: The People's Republic*. *Dirlik or Mazumdar*
 143A. *Ancient and Early Modern Japan*. *Gordon*
 143B. *The Emergence of Modern Japan*. *Gordon*
 195S.08, 196S.08. *Modern Chinese Thought*. *Dirlik*
 195S.17, 196S.17. *Problems in the History of Modern Japan*. *Gordon*

Japanese

- 183, 184. *Topics in Japanese*. *Ching*

Political Science

111. *Contemporary Japanese Politics*. *McKean*
 132. *Politics of Asia*. *Staff*
 133. *Japanese Foreign Relations*. *McKean*

Religion

218. *Religions of East Asia*. *Corless*

Sociology

- 110B. *Comparative Sociology: Asia*. *Lin*

AREA COURSES: EASTERN EUROPE

History

110. *History of Eastern Europe in Modern Times*. *Lerner*
 120. *History of Socialism and Communism*. *Lerner*
 195S.10. *Jews in Eastern Europe in Modern Times*. *Lerner*
 239S. *History of Socialism and Communism*. *Lerner*

Polish

187. *Introduction to Polish Literature*. *Lahusen*

Political Science

105. *The Politics of Democratization in Eastern Europe*. *Kitschelt*

Russian

163. *Literature of the Former Soviet Republics*. *Dobrenko*
 201S.A. *Topics in Comparative Slavic Linguistics: East Slavic*. *Andrews or Pugh*
 201S.B. *Topics in Comparative Slavic Linguistics: West Slavic*. *Andrews or Pugh*
 201S.C. *Topics in Comparative Slavic Linguistics: South Slavic*. *Andrews or Pugh*
 201S.D. *Topics in Comparative Slavic Linguistics: Common Slavic*. *Andrews or Pugh*

AREA COURSES: LATIN AMERICA

Art and Art History

193. *Art and Culture of Mesoamerica*. *Reents-Budet*
 194. *Maya Art and Culture*. *Reents-Budet*
 195. *Pre-Columbian Art and Culture of Andean South America*. *Reents-Budet*
 257S. *Topics in Pre-Columbian Art and Culture*. *Reents-Budet*

Cultural Anthropology

128. Culture and Politics in Latin America. *Starn*

History

104B. A Survey of Latin American History through Film. *TePaske*

131A. History of Mexico and the Caribbean in the Nineteenth and Twentieth Centuries. *TePaske*

136. Introduction to Contemporary Latin American Reality. *James*

173. History of Spain from Late Medieval Times to the Present. *TePaske*

174A. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*

174B. Modern Latin America. *Staff*

195S.22, 196S.22. Problems in Latin-American History. *TePaske*

196S.29. Proletarians and Peasants, Bandits and Prophets: Social Movements in Nineteenth- and Twentieth-Century Latin America. *James*

196S.82. Afro-Brazilian History. *French*

230S. Populism in Latin America. *James*

265S. Problems in Modern Latin American History. *Staff*

Interdisciplinary Courses

198S. Current Topics on Latin America. *Staff*

Political Science

151. Introduction to Latin-American Politics. *Archer*

253S. Comparative Government and the Study of Latin America. *Archer*

Portuguese

111S. Portuguese for Current Affairs. *Damasceno*

200S. Seminar in Portuguese Literature. *Damasceno*

Sociology

110D. Comparative Sociology: Latin America. *Gereffi*

Spanish

115, 116. Introduction to Spanish-American Literature. *Staff*

121. Latin American Literature in Translation. *Dorfman*

143S. Literature of the Discovery and Conquest of America. *Staff*

144S. Spanish-American Literature of Identity. *Pérez Firmat*

145S. Literature of the Hispanic Minorities of the United States. *Pérez Firmat*

146. The Spanish-American Novel. *Moreiras or staff*

147S. Latin American Women Writers. *Staff*

175S. Hispanic Literature and Popular Culture. *Sieburth*

210. History of the Spanish Language. *Garcí-Gómez*

245. Modern Spanish-American Poetry. *Moreiras*

AREA COURSES: MIDDLE EAST

Arabic

125, 126. Advanced Arabic. *Cooke or Cornell*

183,184. Topics in Arabic. *Cooke*

Asian and African Languages and Literature

173S. Women in Arabic Literature. *Cooke*

195. Women in the Middle East. *Cooke*

Cultural Anthropology

126. Muslim World: Transformation and Continuities. *Ewing*

History

152. The Modern Middle East. *Y. Miller*

195S.35. Palestine and the Arab-Israeli Conflict. *Y. Müller*

Interdisciplinary Courses

162, 163. Introduction to Islamic Civilization. *Cornell, Lawrence, and staff*

Public Policy Studies

175S. The Palestine Problem and United States Public Policy. *Kuniholm*

257. United States Policy in the Middle East. *Kuniholm*

Religion

134. Jewish Mysticism. *Bland*

136. Contemporary Jewish Thought. *Bland or E. Meyers*

164. History and Religions of North Africa. *Cornell*
 284. The Religion and History of Islam. *Cornell or Lawrence*

AREA COURSES: NORTH AMERICA

Art and Art History

174. Art and Philosophy from West Africa to the Black Americas. *Powell*
 194. Maya Art and Culture. *Reents-Budet*

Cultural Anthropology

124. American Indian Peoples. *Staff*

English

- 179S. Repairing the Continent: Canadian and U.S. Literary Perspectives. *A. Davidson*
 186A,S. Canadian Literature in English. *A. Davidson*
 186B, S. Canadian Theater. *Staff*

French

- 131S. French in the New World. *Thomas*
 168. Francophone Literature. *Mudimbe-Boyi*
 169. The Contemporary Novel in French Canada. *Keineg*

History

- 106S. Geography of Canada. *Staff*
 108C. Canadian-American Relations. *Thompson*
 115. History of Africa. *Ewald*
 119A, 119B. Native American History. *Wood*
 121A. America in International Affairs, 1607-1861. *Staff*
 124S. Slave Society in Colonial Anglo-America: The West Indies, South Carolina and Virginia. *Gaspar*
 131A. History of Mexico and the Caribbean in the Nineteenth and Twentieth Centuries. *Tepaske*
 131B. The Spanish Caribbean. *TePaske*
 145A,B. Afro-American History. *Gavins*
 166S. American Dreams / American Realities. *Wilson*
 167S. United States and Canadian Constitutional Issues. *Staff*
 168S. The Atlantic Slave Trade. *Gaspar*
 174A. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
 183S. Canada from the French Settlement. *Thompson*
 195S.18. The Destruction and Aftermath of Slavery in the Americas: A Comparative Perspective. *J. Scott*
 195S.40. Fugitive Slave (Maroon) Communities in the New World Slave Societies. *Gaspar*
 195S.45. Canadian and American Agrarian Movements. *Thompson*
 196S.24. Problems in Recent United States Diplomatic History. *Staff*
 206. Origins of Afro-America. *J. Scott*
 216S. U.S. Diplomacy, 1890-1945. *Davis*
 233S. Slave Resistance and Social Control in New World Societies. *Gaspar*

Interdisciplinary Courses

98. Introduction to Canada. *Leclerc or Thompson*
 182. Media in Comparative Perspective. *Smith*
 184S. Canadian Issues. *Staff*
 282. Canada: Research Seminar. *Staff*

Literature

146. The Canadian Image: Cultural Production in French and English Canada. *A. Davidson*
 180. Writings in the Rural Tradition: From the Caribbean to the American South. *Willis*
 181. Literacies and Literatures in the Americas and the Caribbean. *Mignolo or Willis*

Political Science

117. Comparative Government and Politics: Selected Countries. *Staff*
 203S. Issues and Politics and the Media in the United States. *Paletz*
 266S. Comparative Social Policies. *Smith*
 277. Comparative Party Politics. *Lange*

Public Policy Studies

- 265S. The Process of International Negotiation. *Mayer*

Sociology

167. The Social Bases of Politics. *Gereffi or Smith*
 170. Mass Communication. *Smith*

- 171. Comparative Health Care Systems. *Boychuk*
- 179. Modern Nationalist Movements. *Tiryakian*
- 255. Political Sociology. *Smith or Tiryakian*

Spanish

- 115, 116. Introduction to Spanish-American Literature. *Staff*
- 143S. Literature of the Discovery and Conquest of America. *Staff*
- 145S. Literature of the Hispanic Minorities of the United States. *Pérez Firmat*
- 146. The Spanish-American Novel. *Moreiras or staff*
- 245. Modern Latin-American Poetry. *Moreiras or staff*

AREA COURSES: RUSSIA

Economics

- 293S. Soviet Economic History. *Tremblay*
- 294S. Soviet Economic System. *Tremblay*

History

- 120. History of Socialism and Communism. *Lerner*
- 161. History of Modern Russia. *M. Miller*
- 180. The Soviet Experience. *Lerner*
- 195S,30. Problems in Russian History. *M. Miller*
- 201S. The Russian Intelligentsia and the Origins of the Revolution. *M. Miller*
- 202S. The Russian Revolution. *M. Miller*
- 239S. History of Socialism and Communism. *Lerner*
- 262. The Soviet Experience. *Lerner*

Political Science

- 165. Government and Politics of the Soviet Union. *Hough*
- 166. Soviet Foreign Relations. *Hough*

Russian

- 103S, 104S. Studies in Russian Language and Culture. (Taught in Russia.) *Staff*
- 129. Russian Orthodoxy. *Pelech*
- 130. Soviet Cinema. *Gaines, Jameson, and Lahusen*
- 131. Language, Culture, and Myth: The Slavic Proverb. *Staff*
- 135. Contemporary Russian Media. *Andrews*
- 135A. Contemporary Russian Media. (Taught in Russia.) *Staff*
- 155. The Interaction of Russian and American Culture. *Lahusen and Van Tuyl*
- 161, 162. Nineteenth-Century Russian Literature. *Staff*
- 168S. Russian Classical Literature and Music. *Dobrenko*
- 169. Women and Russian Literature. *Gheith*
- 170. Russian Dissident and Emigré Literature. *Lahusen*
- 172S. Pushkin and His Time. *Gheith or Van Tuyl*
- 173S. Gogol. *Lahusen*
- 175. Tolstoy. *Van Tuyl*
- 176. Dostoevsky. *Flath, Gheith, or Van Tuyl*
- 177S. Chekhov. *Flath or staff*
- 178. Russian Short Fiction. *Gheith*
- 180. Early Twentieth-Century Russian Literature: From Symbolism to the 1920s. *Lahusen or staff*
- 181. The 1920s: The Road to a New Synthesis. *Dobrenko or Lahusen*
- 182. Socialist Realism: Soviet Literature of the 1930s and 1940s. *Dobrenko or Lahusen*
- 183. Post-Stalinist and Contemporary Soviet Literature. *Dobrenko or Lahusen*
- 184. Late and Post-Soviet Literature. *Dobrenko, Gheith, or Lahusen*
- 185S. Introduction to Slavic Linguistics. *Andrews*
- 186S. History of the Russian Language. *Pugh*
- 188S, 189S. Advanced Russian Language and Culture. (Taught in Russia.) *Staff*
- 190. Introduction to Russian Civilization. *Pelech*
- 195. Advanced Russian. *Andrews*
- 196. Advanced Russian: Readings, Translation, and Syntax. *Andrews*
- 201S,A. Topics in Comparative Slavic Linguistics: East Slavic. *Andrews or Pugh*
- 201S,B. Topics in Comparative Slavic Linguistics: West Slavic. *Andrews or Pugh*
- 201S,C. Topics in Comparative Slavic Linguistics: South Slavic. *Andrews or Pugh*
- 201S,D. Topics in Comparative Slavic Linguistics: Common Slavic. *Andrews or Pugh*
- 269. Women and Russian Literature. *Gheith*

AREA COURSES: SOUTH ASIA

Asian and African Languages and Literature

- 137. Contemporary Culture in South Asia. *Khanna*
- 138. The Media in Modern India. (Taught in India.) *Khanna*

Cultural Anthropology

- 120. South Asia: Institutions and Change. *Apte or Ewing*

History

- 100E. Indian History and the Present. (Taught in India.) *Kumar*
- 164. India, Pakistan, and Bangladesh: 1750 to the Present. *Richards*
- 195S.21. Problems in Indian History. *Richards*
- 248. History of Modern India and Pakistan: 1857 to the Present. *Richards*

Interdisciplinary Courses

- 101, 102. Introduction to the Civilizations of Southern Asia. *Khanna or staff*
- 162, 163. Introduction to Islamic Civilization. *Cornell, Lawrence, and staff*

Political Science

- 132. Politics of Asia. *Staff*

Religion

- 217. Islam in India. *Lawrence*

AREA COURSES: WESTERN EUROPE

Art and Art History

- 152. Art of the Netherlands in the Sixteenth Century. *Van Miegroet*
- 153. Art of the Northern Netherlands in the Seventeenth Century. *Van Miegroet*
- 154. German Art in the Fifteenth and Sixteenth Centuries. *Van Miegroet*
- 155. Mercantile Culture and Art in the Netherlands. *De Marchi and Van Miegroet*
- 158, 159. Art and Cultural History of Flanders and the Netherlands from the Fifteenth through the Seventeenth Centuries. (Taught in Belgium/Holland.) *Van Miegroet*
- 161. Nineteenth-Century Art, 1789-1848: Revolution to Revolution. *Cernuschi*
- 167. Twentieth-Century Art, 1900-1945. *Cernuschi or Stiles*
- 187. Surrealism. *Stiles*

Cultural Anthropology

- 139. Marxism and Society. *Staff*

Distinguished Professor Course

- 192. French Existentialism: 1940-1960. *Mudimbe*

Economics

- 60. Economics of a United Europe. (Taught in Germany.) *Staff*
- 150. History of Economic Thought (Taught in Holland.) *De Marchi or Goodwin*
- 151. Adam Smith and the System of Natural Liberty. *De Marchi*

French

- 107S. Contemporary Ideas. *Staff*
- 111S. French for Current Affairs. *Keineg or staff*
- 113S. French for Business. *Staff*
- 137. Aspects of Contemporary French Culture (Taught in France.) *Staff*
- 139. French Civilization. *Keineg or Tetel*
- 145S. Topics in Renaissance Literature and Culture. *Tetel*
- 153. The French Enlightenment. *Stewart*
- 166, 167. Contemporary French Life and Thought. *Kaplan*

Germanic Languages and Literature

- 100S. Business German. *Dowell*
- 124S. Contemporary German Women Writers. *Staff*
- 136S. Contemporary Germany. *Hell*
- 152S. Berlin in Literature and Culture. (Taught in Germany.) *Wolfheil*
- 153. Aspects of Contemporary German Culture. (Taught in Germany.) *Staff*
- 160. German Life and Thought. *Borchardt*
- 245S. The Twentieth Century. *Rolleston*
- 247S. Postwar German Literature. *Hell*
- 270. Consciousness and Modern Society. *Rolleston*

History

- 100A. History of Modern Spain. (Taught in Spain.) *Staff*

- 100B. History of Renaissance Italy. (Taught in Italy.) *Witt or staff*
 100C. Nineteenth-Century European Political History. (Taught in France.) *Staff*
 100G. Twentieth-Century Economic and Social History of France, 1860-1944. (Taught in France.) *Staff*
 100K. History of Spain from Late Medieval Times to the Present. (Taught in Spain.) *Staff*
 100L. German History from 1870 to 1970. (Taught in Germany.) *Staff*
 100R. History of Austria. (Taught in Austria.) *Staff*
 107A, 107B. History of England. *Staff*
 117. Early Modern Europe. *Neuschel*
 135B. Germany from 1871 to 1933. *Koonz*
 135C. Germany from 1933 to 1990. *Koonz*
 138. Renaissance and Reformation Germany. *Robishaux*
 171A. History of Women in Early Modern Europe. *Neuschel*
 171B. History of Women in Modern Europe. *Koonz*
 173. History of Spain from Late Medieval Times to the Present. *TePaske*
 195S.07. Religion and Society in Modern British History. *Thorne*
 195S.13. Problems in Early Modern English History. *Herrup*
 195S.15. Society and Polity in France, 1700 to the Present. *Reddy*
 195S.26. State and Society in the Third Reich. *Koonz*
 195S.28. The Spanish Civil War and Its Aftermath. *TePaske*
 195S.31. History and Memory of Nazi Genocide. *Koonz*
 195S.44. Popular Patriotism in Modern British History. *Thorne*
 204. German Society: 1914-1945. *Koonz*
 213S. Early Modern France. *Neuschel*
 214. Class, Public Opinion, and the French Revolution. *Reddy*
 221. Topics in Social and Economic History of Europe, 1200-1700. *Staff*
 251B. Topics in the Intellectual History of Europe, 1450, 1650. *Witt*
 253S, 254S. European Diplomatic History, 1871-1945. *Staff*
 258S. Social Conflict in Weimar and Nazi Germany. *Koonz*
 267S. England in the Sixteenth Century. *Herrup*
 268S. England in the Seventeenth Century. *Herrup*

Interdisciplinary Courses

- 199S. Senior Seminar in German Studies. *Rolleston and staff*

Italian

105. Italian Women Writers. *Finucci*
 131. Topics in Italian Civilization. *Finucci*
 155S. Nineteenth-Century Italian Literature. *Caserta*
 170. Film and the Italian Novel. *Finucci*
 283. Italian Novel of the Novecento. *Caserta*

Literature

132. Dada and Surrealism. *Thomas*

Music

119. The Humanities and Music. *Bartlet*
 143. Beethoven and His Time. *Bartlet, Gulliam, Silbiger, or Todd*
 144. Bach and His Time. *Meniker or Silbiger*
 145. Mozart and His Time. *Silbiger*
 156S. Music History IIA: Late Renaissance, Baroque. *Bartlet, Brothers, Meniker, or Silbiger*
 157S. Music History IIB: Rococo and Classic. *Bartlet, Silbiger, or Todd*
 158S. Music History IV: After 1850. *Staff*
 159S. Music History II: From 1650-1850. *Staff*

Political Science

- 100A.01. Environmental Policy in Europe. (Taught in Germany.) *Staff*
 100A.02. Germany: From Division to Unification. (Taught in Germany.) *Staff*
 100E.01. Media and Politics in Britain. (Taught in England.) *Staff*
 100J.01. Government and Politics of Austria in Europe. (Taught in Austria.) *Staff*
 100K.02. British Government and Constitutional Law. (Taught in England.) *Staff*
 100L.01. Political System of Modern Britain. (Taught in England.) *Staff*
 100M.01. Government and Politics of Spain. (Taught in Spain.) *Staff*
 100N.01. The European Community: Progress, Problems and Prospects. (Taught in Brussels.) *Grieco*
 115. Politics and Society in Germany. *Kitschelt*
 135. Political Development of Western Europe. *Kitschelt or Lange*
 136. Comparative Government and Politics: Western Europe. *Kitschelt or Lange*
 170. Europe Transformed. *Grieco*

- 181. Marxism and Neo-Marxism. *Coles*
- 216S. Evolution of European Marxism. *Coles*
- 225. Topics in Comparative Government and Politics: Western Europe. *Kitschelt or Lange*
- 232. Political Economy: Theory and Applications. *Lange*
- 244S. The Politics of the European Community. *Grieco*

Religion

- 167. The Reformation of the Sixteenth Century. *Hillerbrand*

Sociology

- 110C. Comparative Sociology: Europe. *Staff*
- 138. History of Social Thought. *Tiryakian or Wilson*

Spanish

- 137. Aspects of Contemporary Spanish Culture. *Garci-Gómez*
- 171. Literature of Contemporary Spain. *Osuna*
- 210. History of Spanish Language. *Garci-Gómez*

THE MAJOR

Corequisite Foreign Language Requirement. Four (4) semester courses in a single language of the primary area are required. Students with advanced placement credits or other evidence of foreign language proficiency are not exempted from this requirement. However, in the following cases students may substitute one or two nonlanguage courses to meet this requirement: (1) if a second year of a language is not taught at Duke, or (2) if no language course is available at a sufficiently advanced level. In these cases, approved humanities or social science courses taught in a foreign language, or a year of general linguistics or literature in translation, may be substituted for the second year of a language. The specific language courses are too numerous to list here. Area advisors should be consulted for specific approval of the language choice if it does not conform to the list below.

Africa: Swahili; Arabic; relevant European language, such as French or Portuguese, may be used if appropriate to specific programs.

East Asia: Chinese, Japanese.

Eastern Europe: Relevant Eastern Europe language, such as Polish or Estonian.

Latin America: Spanish; Portuguese for specialization in Brazil.

Middle East: Arabic, Persian; modern Hebrew for specialization in Israel.

North America: French or Spanish.

Russia: Russian.

South Asia: Hindi-Urdu.

Western Europe: French, German, Italian, Portuguese, Spanish.

Major Requirements.

1. **Introductory Courses:** Two (2) introductory courses emphasizing comparative approaches from two different departments. One of these courses must be Comparative Area Studies 110, Global Human Geography. See list above for other introductory courses.
2. **Primary Area Courses:** Four (4) semester courses in the geographical area of special interest (the area of the language studied), with strong commendation for multidisciplinary course selection. Areas and courses are listed above. Others may be selected with the consent of the director.
3. **Secondary Concentration:** The secondary concentration must be in another geographic area. Students must take two (2). Qualifying courses are listed above.
4. **Two (2) Comparative/Global Issues Courses.** To satisfy the comparative/global issue requirements of the major, each student must elect one comparative/global issue course and also take Comparative Area Studies 125, Strategies of Comparative Analysis. Comparative Area Studies 125 will be coordinated by faculty members affiliated with comparative area studies,

but will also include guest lectures. The purpose of this course is to teach students the various strategies that can be employed in making appropriate comparisons within and across distinct regions of the world. The course will offer a lecture / discussion format, and students will be asked to write a series of brief papers that reflect the cross-cultural and interdisciplinary objectives of the major. Normally, students should take this course in their sophomore or junior year, not in their senior year.

Honors Seminar. For graduation with distinction or Latin honors by honors project, the student must complete a research project in the senior year, usually in the Comparative Area Studies 150S senior seminar. Candidates must apply in their junior year. Selection criteria will include both the feasibility of the proposed topic, and the student's ability and skills to carry it out successfully. Inquiries should be addressed to the Director, Comparative Area Studies, 2122 Campus Drive.

Computer Science (CPS)

Professor Vitter, *Chair*; Associate Professor of the Practice Ramm, *Associate Chair*; Assistant Professor of the Practice Astrachan, *Director of Undergraduate Studies*; Professors Behringer, Biermann, Gelenbe, Loveland, Marinos, Palmer, Patrick, Reif, Rose, Starmer, Trivedi, and Utku; Associate Professors Agarwal, Ellis, Greenside, Kedem, and Wagner; Assistant Professors Board, Chase, Dollas, Kao, Prisant, and Sun; Professor Emeritus Gallie; Assistant Professor of the Practice Rodger; Research Assistant Professors Grove and Long; Adjunct Professors Brglez, Coughran, and Whitted; Adjunct Associate Professor Dugan; Adjunct Assistant Professors Levenson and Marshall

A major is available in this department.

The Department of Computer Science provides courses on the concepts of computing and computers, their capabilities, and uses. In most courses students make extensive use of the available computing facilities. Students who wish to take a single introductory course, as part of their general education, usually elect either Computer Science 10 or 50.

In cooperation with the Microelectronics Center of North Carolina (MCNC), the University of North Carolina at Chapel Hill, and other MCNC-affiliated universities in North Carolina, the department often sponsors advanced computer science and other high technology courses originating at other universities. These are available through a closed circuit television and data network belonging to MCNC. Contact the Department of Computer Science for further information on the availability of such courses.

1. Computer Science Fundamentals. (QR) An overview for students not intending to major in computer science. Computer programming, symbolic and numeric computation, electric circuits, architectures, translation, time complexity, noncomputability, and artificial intelligence. Not open to students having credit for Computer Science 50 or higher. Not open to students who have taken Computer Science 10. One course. *Biermann and staff*

4. Introduction to Pascal Programming. (QR) A study of clear thinking and problem solving using the computer. Representation, problem decomposition, and structured programming. Students learn the Pascal language and develop skills by solving a variety of symbolic and numerical problems. Not open to students who have taken Computer Science 50. One course. *Staff*

6. Introduction to Program Design and Analysis I. (QR) Problem-solving techniques using a computer, top-down decomposition and object-oriented solution methodologies, introduction to programming, programming in the C/C++ language, introduction to UNIX and programming environments, recursion, analysis of execution times, linked data structures, searching, and sorting. Normally the first course for majors

in computer science who have no programming experience. Not open to students who have taken Computer Science 8, 52, or 53. One course. *Astrachan or Rodger*

8. Program Design and Analysis I. (QR) Similar to Computer Science 6 except that introductory programming is omitted. Normally the first course for majors in computer science who have proficiency in a computer programming language. Not open to students who have taken Computer Science 6 or 53. One course. *Astrachan or Rodger*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

100. Program Design and Analysis II. (QR) A continuation of Computer Science 6 or 8. Overview of advanced data structures and analysis of algorithms, data abstraction and abstract data types, object-oriented programming, proofs of correctness, complexity, and computability. Not open to students who have taken Computer Science 103. Prerequisite: Computer Science 6, 8, 52, or 53. One course. *Astrachan or Rodger*

104. Computer Organization and Programming. (QR) Computer structure, machine language, instruction execution, addressing techniques, and digital representation of data. Computer systems organization, logic design, microprogramming, and interpreters. Symbolic coding and assembly systems. Prerequisite: Computer Science 100 or 103 or consent of instructor. One course. *Ramm and staff*

106. Programming Languages. (QR) Syntax and semantics of programming languages. Compilation, interpretation, and programming environments; including programming languages such as Algol, PL/1, Pascal, APL, LISP, and Prolog. Exercises in programming. Prerequisite: Computer Science 104. One course. *Staff*

108. Software Design and Implementation. (QR) Techniques for design and construction of reliable, maintainable and useful software systems. Programming paradigms and tools for medium to large projects: revision control, UNIX tools, performance analysis, GUI, software engineering, testing, documentation. Prerequisite: Computer Science 100 or 103. One course. *Astrachan*

109. Program Design and Construction. (QR) Substantial programs. Design specifications, choice of data structures, estimation of programming effort, stepwise development, and program-testing methodology. Programming teams and human factors in system implementation. Advanced topics in use of a procedural language and file management. Not open to students who have taken Computer Science 155. Prerequisite: Computer Science 104. One course. *Staff*

110. Introduction to Operating Systems. (QR) Basic concepts and principles of multiprogrammed operating systems. Processes, interprocess communication, CPU scheduling, mutual exclusion, deadlocks, memory management, I/O devices, file systems, protection mechanisms. Not open to students who have taken Computer Science 131. Prerequisites: Computer Science 100 or 103 and 104. One course. *Staff*

120. Introduction to Switching Theory and Logic Design. (QR) Not open to students who have taken Computer Science 157. See C-L: Electrical Engineering 151. One course. *Marinos or Overhauser*

130. Introduction to the Design and Analysis of Algorithms. (QR) Design and analysis of efficient algorithms for sorting, searching, dynamic structure manipulation, pathfinding, fast multiplication, and others; nondeterministic algorithms and computationally hard problems. Not open to students who have taken Computer Science 174. Prerequisites: Computer Science 100 or equivalent and four semesters of college mathematics. One course. *Staff*

140. Mathematical Foundations of Computer Science. (QR) An introduction to theoretical computer science including studies of abstract machines, the language

hierarchy from regular sets to recursively enumerable sets, noncomputability, and complexity theory. Not open to students who have taken Computer Science 125. Prerequisites: Computer Science 8 or 53 and 100 or 103 and Mathematics 103. One course. *Loveland*

149S. Problem Solving Seminar. (QR) Techniques for attacking, solving, and writing computer programs for challenging computational problems. Algorithmic and programming language tool kits. Course may be repeated. Consent of instructor required. Half course. *Staff*

150. Introduction to Numerical Methods and Analysis. (QR) Theory, algorithms, and software that concern numerical solution of linear equations, approximation and interpolation of functions, numerical solution of nonlinear equations, and numerical solution of ordinary differential equations. Not open to students who have taken Computer Science 121. Prerequisite: Computer Science 8 or 53; Mathematics 31; 32; 104 or 111. One course. *Staff*

170. Methodologies in Artificial Intelligence. (QR) Theories of representation and search in artificial intelligence. Logic, semantic networks, production rules, frames, distributed models, and procedural representations; algorithmic and heuristic search. Not open to students who have taken Computer Science 115. One course. *Biermann or Loveland*

191, 192. Independent Study. Directed reading and research for qualified juniors. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

196. Topics in Computer Science. (QR) Topics from various areas of computer science, changing each year. Prerequisites: Computer Science 8 and 100 or equivalent. One course. *Staff*

198S. Seminar in Research Practice and Methodology. (QR) Methodologies in the formulation, analysis, and solution of ill-posed and ill-structured problems. General research techniques, mathematical modeling, search methodologies, experimental design, simulation, statistical analysis, report writing. Not open to students who have taken Computer Science 185S. Prerequisites: four courses in mathematics (MTH 31 or above), four courses in computer science (CPS 8 or 53 or above), and one course in statistics. One course. *Biermann and staff*

For Seniors and Graduates

206. Programming Languages. (QR) Information binding, data structures and storage, control structures, recursion, execution environments, input/output; syntax and semantics of languages; study of PL/1, Fortran, Algol, APL, LISP, SNOBOL, and SIMULA; exercises in programming. Not open to students who have taken Computer Science 201. Prerequisite: Computer Science 200 or 208. One course. *Staff*

208. Programming Methodology. (QR) Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies, choice and effective use of programming languages and systems, psychology of computer programming, proof of correctness of programs, analysis of algorithms, and properties of program schemata. Not open to students who have taken Computer Science 200. Prerequisite: Computer Science 100 or 103. One course. *Staff*

210. Operating Systems. (QR) Fundamental principles of operating system design applied to state-of-the-art computing environments (multiprocessors and distributed systems) including process management (coscheduling and load balancing), shared memory management (data migration and consistency), and distributed file systems. Advanced topics include transaction-based operating systems, reliable communication protocols, concurrency control and recovery mechanisms, computer security, and performance analysis. Not open to students who have taken Computer Science 231. One course. *Ellis*

214. Computer Networks and Distributed Systems. (QR) Basic systems support for process-to-process communications across a computer network. The TCP/IP protocol suite and the Berkeley sockets application programs interface. Development of network application programs based on the client-server model. Remote procedure call and implementation of remote procedure call. Not open to students who have taken Computer Science 255. Prerequisite: knowledge of the C programming language. One course. *Staff*

216. Data Base Methodology. (QR) Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Not open to students who have taken Computer Science 241. Prerequisites: Computer Science 104 and either 109 or 155 or equivalent. One course. *Staff*

218. Compiler Construction. (QR) Models and techniques used in the design and implementation of assemblers, interpreters, and compilers. Lexical analysis, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation and optimization techniques. Not open to students who have taken Computer Science 232 before fall 1994. One course. *Staff*

220. Computer Systems Organization. Hardware and software aspects. Processor, memory, device, and communication subsystems; case studies of hardware system organization, for example, parallel, associative, fault-tolerant; organization of software systems to exploit hardware systems organization; economic and reliability aspects of various hardware organizations. Not open to students who have taken Computer Science 252 before fall 1994. Prerequisites: Computer Science 104 and 120 or 157. One course. *Wagner*

222. Introduction to VLSI Systems. A first course in VLSI design with CMOS technologies. A study of devices, circuits, fabrication technology, logic design techniques, subsystem design and system architecture. Modeling of circuits and subsystems. Testing of gates, subsystems and chips, and design for testability. The fundamentals of full-custom design, and some semi-custom design. Not open to students who have taken Computer Science 210 before fall 1994. Prerequisite: Electrical Engineering 151 or equivalent; Electrical Engineering 161 or equivalent. One course. *Dollas or Kedem*

223. Application Specific VLSI Design. (QR) Introductory VLSI design course. Modern design methods and technology for implementing application specific integrated circuits (ASICs). Semicustom design methodology, semicustom VLSI technologies such as gate arrays, standard cells and FPGAs; the use of ASIC Computer Aided Design (CAD) tools. Mapping algorithms into high performance silicone implementation. Prerequisite: course in logic design. One course. *Kedem*

225. Fault-Tolerant and Testable Computer Systems. Not open to students who have taken Computer Science 207. Prerequisite: Electrical Engineering 151 or equivalent. See C-L: Electrical Engineering 254. One course. *Marinos*

226. Mathematical Methods for Systems Analysis I. (QR) Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics,

queuing theory, and simulation. Prerequisite: four semesters of college mathematics. C-L: Electrical Engineering 255. One course. *Trivedi*

228. Communication, Computation, and Memory in Biological Systems. (QR) Communication and memory in biological systems: voltage sensitive ion channels, hormone-receptor interactions, and initiation and control of RNA/DNA synthesis. Models of signaling and memory are developed and related to electronic signaling schemes. Not open to students who have taken Computer Science 276. Prerequisites: Computer Science 100 or 103, two semesters of college chemistry, and four semesters of college mathematics. One course. *Starmer*

230. Design and Analysis of Algorithms. (QR) Design and analysis of efficient algorithms. Algorithmic paradigms. Applications include sorting, searching, dynamic structures, graph algorithms, randomized algorithms. Computationally hard problems. NP completeness. Not open to students who have taken Computer Science 205. Prerequisite: Computer Science 100 or equivalent. One course. *Staff*

232. Mathematical Analysis of Algorithms. (QR) Techniques for efficient implementation and precise analysis of computer algorithms. Combinatorial mathematics and elementary probability. Emphasis on obtaining exact closed-form expressions describing the worst-case or average-case time and space requirements for particular computer algorithms, whenever possible. Asymptotic methods of analysis for obtaining approximate expressions in situations where exact expressions are too difficult to obtain or to interpret. Not open to students who have taken Computer Science 202. Prerequisites: Mathematics 103 and 104 or equivalents. One course. *Staff*

234. Computational Geometry. (QR) Models of computation and lower-bound techniques; storing and manipulating orthogonal objects; orthogonal and simplex range searching, convex hulls, planar point location, proximity problems, arrangements, linear programming and parametric search technique, probabilistic and incremental algorithms. Not open to students who have taken Computer Science 240 before fall 1994. Prerequisite: Computer Science 205 or 230 or equivalent. One course. *Agarwal or Reif*

236. Parallel Algorithms. (QR) Models of parallel computation including parallel random access machines, circuits, and networks; NC algorithms and P-completeness; graph algorithms, sorting algorithms, network routing, tree contraction, string matching, parsing algorithms; randomization and derandomization techniques. Not open to students who have taken Computer Science 230 before fall 1994. Prerequisite: Computer Science 205 or 230 or equivalent. One course. *Kao or Reif*

238. Numerical and Algebraic Algorithms. (QR) Introduction to polynomial problems, matrix problems—general and sparse; numerical algorithms, fast Fourier transform, eigenvalue computation, number theory and cryptography. Not open to students who have taken Computer Science 206 before fall 1994. Prerequisites: Computer Science 230 and 252, or equivalents. One course. *Reif or Rose*

240. Computational Complexity. (QR) Turing machines, undecidability, recursive function theory, complexity measures, reduction and completeness, NP, NP-Completeness, co-NP, beyond NP, relativized complexity, circuit complexity, alternation, polynomial time hierarchy, parallel and randomized computation, algebraic methods in complexity theory, communication complexity. Not open to students who have taken Computer Science 225 before fall 1994. Prerequisite: Computer Science 140 or equivalent. One course. *Agarwal*

242. Logic for Computer Science. (QR) Aspects of logic with a focus on computational issues. Topics include propositional and predicate calculi and the theory underlying their automation, that is, the compactness theorems, the Herbrand-Skolem-Gödel theorem, unification, and resolution. Proof procedures and their search characteristics.

The use of natural deduction and sequent calculi in describing logics, specifying programming language semantics and formalizing type systems. Structural properties, such as cut-elimination, in such systems. The logical systems underlying programming languages like Prolog and ML. Applications of logic in automated reasoning, program verification and synthesis. Not open to students who have taken CPS 218 before fall 1994. C-L: Philosophy 210. One course. *Loveland*

250. Numerical Analysis. (QR) Error analysis, interpolation and spline approximation, numerical differentiation and integration, solutions of linear systems, nonlinear equations, and ordinary differential equations. Not open to students who have taken Computer Science 221. Prerequisites: knowledge of an algorithmic programming language, intermediate calculus including some differential equations, and Mathematics 104. C-L: Mathematics 221 and Statistics 273. One course. *Greenside or Rose*

252. Numerical Differential Equations. (QR) Numerical methods for solving ordinary and partial differential equations emphasizing nonlinear differential equations. Methods for solving ordinary differential equations that generalize to solve partial differential equations: finite difference, spectral, and finite element methods. Solution of hyperbolic, parabolic, and elliptical partial differential equations arising in scientific problems. Not open to students who have taken Computer Science 222 before fall 1994. Prerequisite: Computer Science 221 or 250. C-L: Mathematics 222. One course. *Greenside or Rose*

254. Numerical Linear Algebra. (QR) Solution of large, sparse linear systems of equations. Storage schemes, graph theory for sparse matrices, different orderings to minimize fill, block factorizations, iterative methods, analysis of different splittings, conjugate gradient methods. Eigenvalue problems, QR factorization, Lanczos method, power method and inverse iteration, Rayleigh quotient. Not open to students who have taken Computer Science 223 before fall 1994. Prerequisite: Computer Science 221 or 250 or equivalent. C-L: Mathematics 223. One course. *Rose*

256. Functional Analysis for Scientific Computing. (QR) Linear spaces, topologies, norms, and completeness. Focus on Banach and Hilbert spaces including Sobolev spaces. Linear and nonlinear operators. Fréchet derivatives. Iterative methods for nonlinear operator systems, such as Newton-like methods. Applications. Intended for science and engineering students but not mathematics graduate students. Not open to students who have taken Computer Science 245. Prerequisite: Computer Science 221 or 250. C-L: Mathematics 245. One course. *Rose*

260. Introduction to Computational Science. (QR) Introduction for students and faculty to computing resources that facilitate research involving scientific computing: contemporary computers, programming languages, numerical software packages, visualization tools, and some basic issues and methods for high performance algorithm design. Prerequisite: programming experience in Fortran or C, calculus, numerical linear algebra or equivalent. One course. *Greenside, Rose, or Sun*

264. Nonlinear Dynamics. (QR) Introduction to the mathematical theory of nonlinear dynamics, and how this theory compares with physical experiments, with applications to biology (Turing states and morphogenesis), computer science (randomness and computability), mathematics (chaos and strange attractors), and physics (pattern formation and transition to turbulence). Not open to students who have taken Computer Science 213. Prerequisites: Computer Science 8 or 53, Mathematics 111, and Physics 51L, 52L. C-L: Physics 213. One course. *Behringer or Greenside*

270. Artificial Intelligence. (QR) Heuristic versus algorithmic methods; programming of games such as chess; theorem proving and its relation to correctness of programs; readings in simulation of cognitive processes, problem solving, semantic

memory, analogy, adaptive learning. Not open to students who have taken Computer Science 215. Prerequisite: Computer Science 100 or 103 or consent of instructor. One course. *Biermann or Loveland*

274S. Computational Linguistics Seminar. (QR) Readings and research seminar on topics related to the processing of English or other natural languages: syntax, semantics, pragmatics, discourse, and others. Not open to students who have taken Computer Science 216S. Prerequisite: Computer Science 215 or 270 or consent of instructor. One course. *Biermann*

291. Reading and Research in Systems. (QR) One course. *Staff*

292. Reading and Research in Algorithms and Complexity. (QR) One course. *Staff*

293. Reading and Research in Scientific Computing. (QR) One course. *Staff*

294. Reading and Research in Artificial Intelligence. (QR) One course. *Staff*

296. Advanced Topics in Computer Science. Not open to students who have taken Computer Science 265. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

155. Program Design and Construction. (QR)

157. Introduction to Switching Theory and Logic Design. (QR)

THE MAJOR

For the A.B. Degree

Prerequisites. Mathematics 31, 32.

Major Requirements. Computer Science 6 or 8, 100, 104, 108, 110, and 130; two electives at the 100 level or above: one in mathematics, and one in computer science or electrical engineering; and Mathematics 135 or Statistics 112. Suggested sequences to fill these elective slots would be a scientific computing sequence: Mathematics 104 and Computer Science 150, or the general symbolic computation sequence: Mathematics 187 and Computer Science 170 or 198. If Mathematics 135 is elected, it is recommended that it be followed by Mathematics 136. Students must complete at least five additional courses at the 100 level or above (excluding the above listed requirements). The five courses may be a mixture of courses in Computer Science and/or one other department, or with the approval of the director of undergraduate studies, may consist of a coherent plan of courses drawn from multiple departments.

For the B.S. Degree

Prerequisites. Mathematics 31, 32, 103, 104; one of the following pairs of courses: Chemistry 11L, 12L or Physics 51L, 52L or Physics 53L, 54L or Physics 41L, 42L.

Major Requirements. Computer Science 6 or 8, 100, 104, 108, 110, 130, 140, and 150; two elective courses at the 100 level or above in computer science, electrical engineering, or mathematics; Electrical Engineering 151; Mathematics 135 or Statistics 112; and Mathematics 124 or 187. If Mathematics 135 is selected, it is recommended that Mathematics 136 be taken also.

Honors/Distinction

Students who are qualified (see the section on honors in this bulletin) may undertake work leading to a B.A. or B.S. degree with distinction in computer science by applying to the director of undergraduate studies. Normally, candidates must have grades of A in computer science courses. They must complete a substantial project, suitably docu-

mented, or a distinguished paper on which they will be examined orally by a committee of three faculty members.

Cultural Anthropology (CA)

Associate Professor Quinn, *Chair*; Assistant Professor Litzinger, *Director of Undergraduate Studies*; Professors Apte, Mudimbe (literature), O'Barr, and Reddy (history); Associate Professor Silverblatt; Assistant Professors Allison, Ewing, Starn, Strauss, and Tetel (English); Professors Emeriti Friedl and LaBarre; Assistant Research Professor Chandler (English); Assistant Professor of the Practice Luttrell; Adjunct Professors Conley and Peacock; Visiting Assistant Professor Piot

A major is available in this department.

Cultural anthropology is a comparative discipline that studies the world's peoples and cultures. It extends perspectives developed from anthropology's initial encounter with the "primitive" world to studies of complex societies including rural and urban segments of the Third World and contemporary industrial countries. Cultural anthropologists at Duke concentrate on political economy, culture, ideology, history, and discourse, and the relations among them. These concerns lead them to such specific research and teaching interests as: colonialism and state formation; the role of culture in cognition; the politics of representation and interpretation; the bases of ideological persuasion and resistance; gender ideology; language use in institutional contexts; class formation and political consciousness; the creation and use of ethnic and national identities. The department also offers courses that introduce the various traditional subfields of cultural anthropology, and other, integrative courses on world areas. Students without prerequisites for a course may ask the instructor for admission.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

94. Introduction to Cultural Anthropology. (SS) Theoretical approaches to analyzing cultural beliefs and practices cross-culturally; application of specific approaches to case material from present and/or past cultures. C-L: Comparative Area Studies. One course. *Staff*

100. Foundations of Cultural Anthropology. (SS) Major schools and theories of cultural anthropology. Required course for cultural anthropology majors. Normally taken in sophomore or junior years. C-L: Comparative Area Studies. One course. *Staff*

101, 102. Introduction to the Civilizations of Southern Asia. (CZ) See C-L: Interdisciplinary Course 101, 102; also C-L: Asian and African Languages and Literature 160, 161; Comparative Area Studies; History 193, 194; and Religion 160, 161. One course each. *Khanna or staff*

103. Sexuality and Culture in America. (SS) The different cultural contexts that give meaning to and regulate sexuality in America. Topics include the rise of youth culture and its impact on sexual expression; the effects of popular culture and media on sexual beliefs and practices; how different campus cultures shape sexual behaviors and attitudes; and the rise of gay and lesbian culture and politics. C-L: Sociology 103 and Women's Studies. One course. *Luttrell*

104. Anthropology and Film. (SS) The study of feature films and documentaries on issues of colonialism, imperialism, war and peace, and cultural interaction. An introduction to critical film theory and film production in non-Western countries. C-L: Film and Video. One course. *Litzinger*

105S. Theme Seminar. Topics vary. One course. *Staff*

106. The Anthropology of Everyday Life in America. (SS) Various popular cultural forms—the game of baseball, the cowboy and the western, the ritual cycle (from

Halloween through Easter), the new children's video games (Nintendo, Sega Genesis)—are explored for the way in which they at once reproduce and subvert American ideology. One course. *Piot*

107. Introduction to Linguistics. (SS) Origin and nature of language; methods of descriptive linguistics with reference to historical and comparative linguistics. C-L: English 111, Interdisciplinary Course 111, and Linguistics. One course. *Butters or Tetel*

108S. Popular Culture and Mass Media. (SS) Cross-cultural examination of the ways in which the mass media transmits images, stories, and representations about the world. How media technology has developed, become popularized as entertainment as well as information, and entered the global market. One course. *Allison*

109. Contemporary Global Issues. (SS) See C-L: Comparative Area Studies 109; also C-L: History 109, Political Science 160, and Sociology 175. One course. *Staff*

110. Advertising and Society: Global Perspective. (SS) History and development of commercial advertising; advertising as a reflector and/or creator of social and cultural values; advertisements as cultural myths; effects on children, women, and ethnic minorities; advertising and language; relation to political and economic structure; and advertising and world culture. Emphasis on American society complemented by case studies of advertising in Europe, Japan, and selected Third World societies. C-L: English 120, Film and Video, Sociology 160, and Women's Studies. One course. *Luttrell, O'Barr, J. Smith, or Wilson*

111. Anthropology of Law. (SS) Comparative approach to jurisprudence and legal practice, dispute resolution, law-making institutions and processes, and the relation of law to politics, culture, and values. One course. *Conley or O'Barr*

112. Current Topics in Linguistics. (SS) Advanced study of an area of linguistics or grammar. C-L: English 119, Interdisciplinary Course 119, and Linguistics. One course. *Staff*

113. Gender and Culture. (SS) Explanation of differing beliefs about gender cross-culturally, by comparison with dominant themes about gender in our own cultural history and contemporary ideological struggles. C-L: Women's Studies. One course. *Silverblatt*

115S. The Anthropology of Gender: Special Topics. (SS) Topics to be selected each semester from: gender myths; gender in mass media; science, gender, and culture; gender, work, and family; gender and the state; and others. C-L: Women's Studies. One course. *Allison, Luttrell, Quinn, Silverblatt, or Starn*

117. Global Culture. (SS) Globalization examined through some of its dominant cultural forms—the marketing of pop music, the dissemination to TV culture, the spread of markets and commodities, the export of political ideologies. Special attention given to the implication of globalization for individual and group identity. One course. *Piot*

119. Language, Culture, and Society. (SS) Analysis of language behavior within and across societies. Topics include the relation of language structures to cultural values, the role of speech in expressing and creating relations of power and intimacy, and the way social ideologies shape different kinds of discourse. C-L: Comparative Area Studies and Linguistics. One course. *Apte, O'Barr, or Strauss*

120. South Asia: Institutions and Change. (CZ) Cultures and societies of India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Bhutan with emphasis on social institutions, behavioral patterns, value systems, and sociocultural change. C-L: Comparative Area Studies. One course. *Apte or Ewing*

121. Culture and Politics in China. (CZ, SS) Introduction to the study of contemporary China, including Taiwan and the Chinese Diaspora. Key themes include family and kinship, sex and gender, regional diversity, ethnic minority relations, the politics of modernity, revolution, and reform, and the representation of Chinese identity through popular media, film, and travel. C-L: Comparative Area Studies. One course. *Litzinger*

122. Culture and Politics in Africa. (CZ) Cultures and societies of Africa through the study of kinship, politics, economics, ecology, religion, and aesthetics in the context of colonialism and postcolonialism. C-L: African and Afro-American Studies 122 and Comparative Area Studies. One course. *Piot*

124. American Indian Peoples. (CZ) Past and contemporary conditions of American Indian life, with an emphasis on North America. Social and political organization, gender relations, changing economic patterns, cultural themes and variations, spirituality, the effects of anti-Indian wars, policies, and prejudice, and the emergence of movements for self-determination. C-L: Comparative Area Studies. One course. *Staff*

125. Comparative Approaches to Global Issues. (SS) See C-L: Comparative Area Studies 125; also C-L: History 137, Political Science 125, Religion 121, and Sociology 125. One course. *Staff*

126. Muslim World: Transformations and Continuities. (SS) The diversity of social practices within the community of Islam. Particular emphasis on gender relations, religious movements, and social change. C-L: Comparative Area Studies and Women's Studies. One course. *Ewing*

127. Culture and Politics in Japan. (CZ) The intersection between Japanese economic and political institutions and the cultural conventions that establish and challenge Japanese identity in the 1990s. One course. *Allison*

128. Culture and Politics in Latin America. (CZ) Key themes in Latin American societies, including art, literature, history, violence and human rights, economic development, and rebellion and revolution. C-L: Comparative Area Studies. One course. *Starn*

133S. Critical Perspectives on Ethnography. (SS) Overview and evaluation of the conceptual, theoretical, and methodological aspects underlying ethnographic fieldwork, and the writing and reading of ethnographies. One course. *Apte*

135. American Values. (SS) An examination of the major values said to characterize Americans—the values of self-reliance, equality, success, self-realization, and love among others—tracing their persistence and change over time, investigating compatibilities and conflicts among them, and comparing the American case with other strategically selected cases in order to illuminate the American pattern. One course. *Quinn or Strauss*

136S. American Marriage. (SS) The American ideal of marriage, the powerful cultural themes it incorporates and replays, the ideological and actual conflicts it engenders, and its interplay with economic and social forces, historical change, and subcultural variation. One course. *Quinn*

139. Marxism and Society. (SS) A critical appraisal of Marxism as a scholarly methodology for understanding human societies. The basic concepts of historical materialism, as they have evolved and developed in historical contexts. Topics include sexual and social inequality, alienation, class formation, imperialism, and revolution. Core course for the program in Perspectives on Marxism and Society. C-L: Comparative Area Studies, Education 139, History 186, Interdisciplinary Course 139, Literature 139, and Sociology 139. One course. *Staff*

141. Self and Society. (SS) The nature of human social identities, the contexts in which they are shaped, and the processes by which they change. One course. *Apte, Ewing, or Luttrell*

142. Sexuality in Global Perspective. (SS) Cross-cultural perspectives on the meaning, regulation, and politics of sexuality. Course materials drawn from historical-comparative and ethnographic sources with emphasis on variations in how masculinity and femininity are represented; what is considered erotic; how heterosexuality and homosexuality are defined; impact of Western notions about sexuality on the lives of people in Third World countries. C-L: Comparative Area Studies and Women's Studies. One course. *Luttrell*

143. Education, Culture, and Society. (SS) How social divisions and inequalities are created and challenged through the schooling process. Primary emphasis on American education. C-L: Education 143. One course. *Luttrell*

145. Medical Anthropology. (SS) The role of cultural beliefs, social organization, poverty, and privilege in shaping disease and illness, healing and health care delivery, and patient-healer relationships. One course. *Staff*

147, 148. Introduction to Islamic Civilization. (CZ) See C-L: Interdisciplinary Course 162, 163; also C-L: Comparative Area Studies; History 101G, 102G; Medieval and Renaissance Studies; and Religion 162, 163. One course each. *Cornell, Lawrence, and staff*

151. Culture and Thought. (SS) The cultural basis of understanding, including feeling, motivation, and cognitive tasks such as reasoning and categorizing. Reconstruction of cultural assumptions from discourse. Evidence for cross-cultural variation and cultural universals in human thought. Not open to students who have taken Cultural Anthropology 251 (Cognitive Anthropology). One course. *Quinn or Strauss*

163. Foundations of Chinese Civilization. (CZ) The contemporary experience in China and its relation to ethnic, spiritual, social, aesthetic, moral, political, and economic themes in China's past. (Taught in China.) Not open to students who have taken History 163. C-L: Comparative Area Studies and History 100J. One course. *Staff*

165. Psychological Anthropology. (SS) The influence of society on human personality and cognition. Theoretical and ethnographic studies used to explore topics that may include gender, sexuality, emotions, parent-child interaction, the effect of language on thought, and the universality of the "self." One course. *Ewing or Strauss*

180. Current Issues in Anthropology. (SS) Selected topics in methodology, theory, or area. One course. *Staff*

180S. Current Issues in Anthropology. (SS) Same as Cultural Anthropology 180 except instruction is provided in seminar format. One course. *Staff*

184S. Canadian Issues. (SS) Prerequisite: Interdisciplinary Course 98 or consent of instructor. See C-L: Interdisciplinary Course 184S; also C-L: Canadian Studies, Comparative Area Studies, Economics 184S, History 184S, Political Science 184S, and Sociology 184S. One course. *Staff*

185S. The Canadian Health Care System. (SS) See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Economics 185S, History 108E, Political Science 185S, Public Policy Studies 187S, and Sociology 185S. One course. *Boychuck or LeClerc*

193. Independent Study. Directed reading and research. Open only to qualified seniors, with consent of director of undergraduate studies. One course. *Staff*

195S, 196S. Senior Seminar. Consent of director of undergraduate studies required. One course each. *Staff*

For Seniors and Graduates

206S. Anthropological Controversies. (SS) Central issues in anthropological theory and method examined through some of the discipline's major controversies: Mead vs. Freeman on Samoan sexuality; Weiner vs. Malinowski on the kula; Sahlins vs. Obeyesekere on Cook and Hawaii; Harris vs. critics on the sacred cow; Harris vs. Sahlins on Aztec cannibalism; and Leach vs. Levi-Strauss on generalized exchange. One course. *Piot*

207S. Anthropology and History. (SS) Recent scholarship that combines anthropology and history, including culture history, ethnohistory, the study of mentalité, structural history, and cultural biography. The value of the concept of culture to history and the concepts of duration and event for anthropology. Prerequisite: major in history, one of the social sciences, or comparative area studies; or graduate standing. C-L: History 210S. One course. *Reddy*

208S. Postcolonial Anthropology. (SS) Interdisciplinary approach to the review and critique of postcolonial ethnography and historiography. How postcolonial scholarship questions historical modes of cultural ordering and representation and envisions new modes of reading and writing in relation to global structures of domination. One course. *Ewing, Litzinger, Silverblatt, or Starn*

210S. Ideology and the Image in Ethnographic Film. (SS) Overview of the history of ethnographic film. Emphasis placed on knowledge of the film canon, recent innovations in ethnographic documentation, and critical skills for understanding the political and epistemological quandaries of representation. Topics such as narrativity, authorship, spectatorship, and psychoanalytic and feminist film criticism explored in relation to ethnographic film theory and practice. C-L: Film and Video. One course. *Litzinger*

211S. Ethnography of Communication. (SS) History of the mutual influence of linguistics and anthropology leading to the development of ethnography of speaking, ethnoscience, structuralism, and sociolinguistics. Topics vary each semester. Prerequisite: Cultural Anthropology 107 or 119. C-L: Linguistics. One course. *Apte or O'Barr*

214. Postmodernism and the Problem of Representation. (SS) How postmodernism has shaped recent anthropological discourse. Analysis of the premises of postmodernist epistemology and identification of key issues such as truth, authority, and power that are raised by postmodernist critiques of ethnographic representation. Examination of both traditional and experimental ethnographies. One course. *Ewing*

215S. The Anthropology of Gender: Theoretical Issues. (SS) Topics to be selected each semester from: feminist theory and anthropology; Marxism and feminism; gender, ideology, and culture; gender and colonialism; gender and the third world; and others. C-L: Women's Studies. One course. *Allison, Luttrell, Quinn, Silverblatt, or Starn*

216S. Gender, Race, and Class. (SS) Gender, race, and class as theoretical constructs and lived experiences. Analytical frameworks include social history, discourse analysis, critical theory, cultural studies, and feminist theories. Consent of instructor required. One course. *Luttrell*

220S. Theoretical Bases of Social Interpretation. (SS) See C-L: History 290S. One course. *Reddy*

234S. Political Economy of Development: Theories of Change in the Third World. (SS) See C-L: Political Science 234S; also C-L: Comparative Area Studies, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Staff*

250S. Culture and Discourse. (SS) Theoretical approach to culture and methods for the investigation of culture through analysis of discourse, especially interview texts. Application of this approach and these methods to the study of a domain of American culture. C-L: Linguistics. One course. *Apte, Ewing, O'Barr, Quinn, or Strauss*

251. Cognitive Anthropology. (SS) A cognitively-based theory of culture, its history, justification, substantiation through discourse analysis, application to everyday understanding, feeling and motivation, and implications for the acquisition of culture, cross-cultural variation and cultural universals in human thought. Not open to students who have taken Cultural Anthropology 151. One course. *Quinn or Strauss*

258S. Theories of Symbolism. (SS) Influential interpretations of symbols, what they do, and how they do it. The relationship of language to symbolism and symbolism to power. Prerequisites: junior/senior status and at least two courses in cultural anthropology, or graduate standing. One course. *Ewing*

261. Religion: Tradition and Cultural Innovation. (SS) Analysis of anthropological approaches to religion, with an emphasis on how these theories account for conflict and change as they are manifested in religious symbols and ritual action. One course. *Ewing or Piot*

262S. Anthropology and Folklore. (SS) Origins, conceptualizations and theoretical orientations, methodology, and subject matter of the discipline of folklore and exploration of its similarities with and differences from sociocultural anthropology. One course. *Apte*

265S. Anthropological Approaches to Life History. (SS) Form and function of life history and its linkages to sociocultural systems; methodology for collecting life history in ethnographic fieldwork; textual, social-structural, and interpretive analyses of life history. One course. *Apte*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Consent of instructor required. One course each. *Staff*

282S. Canada. (SS) See C-L: History 282S; also C-L: Canadian Studies, Comparative Area Studies, Economics 282S, Interdisciplinary Course 282S, Political Science 282S, and Sociology 282S. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

94S. Introduction to Cultural Anthropology. (SS)

116. Language, Ethnicity, and New Nations. (SS)

118S. The Language of Advertising. (SS)

123. Societies of Mediterranean Europe. (CZ)

132. Anthropology of Peace and War. (SS)

140. The Anthropology of Race. (SS)

161. Anthropological Approaches to Religion. (SS)

164. Peasantry and Peasant Movements. (SS)

173. Revolutions in Latin America. (CZ)

201S. Marxism and Anthropology. (SS)

219. Language and Social Theory. (SS)

239. Culture and Ideology. (SS)

272S. Marxism and Feminism. (SS)

THE MAJOR

Major Requirements. A total of ten courses distributed in the following manner:

- Cultural Anthropology 100.

- At least three courses at the 100-level taught by individuals with actual appointments in cultural anthropology, not just cross-listed with cultural anthropology. At present, the list of courses fulfilling this requirement consists of Cultural Anthropology 103, 104, 105S, 106, 108S, 110, 111, 113, 115S, 117, 118S, 119, 120, 121, 122, 124, 126, 127, 128, 132, 133S, 135, 136S, 139, 141, 142, 143, 145, 151, 155, 165, 173, 180, 180S, 193, 195S, and 196S.

- At least two 200-level courses from the cultural anthropology department's course list.

- Any four additional courses from the cultural anthropology department's course list, not more than one below the 100-level.

Suggested Work in Related Disciplines. Related courses in other departments are strongly advised. Each student's advisor will recommend a program of related work to complement the student's concentration and interests in cultural anthropology.

Honors/Distinction. The department offers an intensive and personalized honors program to qualified seniors, who research and write a senior honors thesis on a topic of their own choice in close collaboration with members of the cultural anthropology faculty. Admission to the program requires a 3.3 grade point average overall and a 3.3 grade point average in the major, both of which must be maintained to graduation for the student to be eligible for Latin honors. Qualified juniors will be notified each year by the director of undergraduate studies about their eligibility. To pursue honors, students must then enroll in the senior seminar, Cultural Anthropology 195S and Cultural Anthropology 196S, in the fall and spring of their senior year, where they will learn about research methods and prepare a thesis. Credit for Cultural Anthropology 195S and Cultural Anthropology 196S is given for a passing grade whether or not the student is awarded honors. The thesis can be based on original fieldwork on a topic of the student's choice, archival or library research, or some combination of various anthropological methods. Previous topics have ranged from studies of the influence of feminism in cultural anthropology to causes of revolution in Latin America and patterns of socialization of Mormon youth in Utah. The student also forms a supervisory committee for the thesis during the fall of the senior year. It should consist of three faculty members, who offer the student advice and support in preparing the thesis. At least two of the members must be faculty from the cultural anthropology department. Due in April of the senior year, the thesis must be judged of at least B+ quality by the supervisory committee to receive Latin honors. In addition, the student must pass an oral examination on the thesis, which is given on its completion by the supervisory committee. Students who fulfill the above requirements both graduate with distinction in cultural anthropology and receive Latin honors. A typical sequence would be:

- select a research topic;
- take the senior seminar in fall and spring;
- form a supervisory committee;
- complete the research and writing by April and submit the final draft to the supervisory committee;
- schedule the oral defense for some time in early or mid-April;
- defend the thesis in an oral examination given by the supervisory committee.

Students who have a 3.0 grade point average overall and a 3.3 grade point average in the major, both of which must be maintained to graduation, may also enroll in Cultural Anthropology 195S and Cultural Anthropology 196S to pursue graduation with distinction in cultural anthropology. With the exception of the lower overall grade point average requirement, the requirements for distinction are the same as those for Latin honors, including the writing and approval of a thesis.

Dance Program (DAN)

Associate Professor of the Practice Dickinson, *Director of the Program and Director of Undergraduate Studies*; Professor of the Practice Taliaferro; Associate Professor of the Practice Sommer; Assistant Professors of the Practice Childs and Dorrance; Instructor Davis

A certificate, but not a major, is available in this program.

The Dance Program offers its students the opportunity to study modern dance, ballet, dance history, choreography, repertory, and non-Western dance forms in an environment that challenges the student's intellectual, expressive, and physical capabilities. A balanced integration between the creative/performance and the historical/theoretical aspects of dance is emphasized. Academic courses in dance provide a historical and theoretical foundation for the student's creative work. In turn, the student's participation in dance creation and performance, and the development of technical skill, deepen the student's scholarly appreciation of the medium. With this approach the aim of the program is to develop students who are sensitive physical communicators of the visual art of dance and who are articulate spokespeople for the art form.

Courses in technique and performance (partial credit courses) and theory courses (whole course credit) are offered. Dance theory courses fulfill seminar and the arts and literature area of knowledge requirements. Courses in technique and performance may be repeated for credit. A maximum total of four course credits (made up of partial credit courses) in technique and performance courses may count toward the thirty-four courses required for graduation.

The certificate, representing an area of concentration supplementing but not replacing a major, is available to all students in the program who meet the following requirements. To earn the certificate in dance, students take six course credits: one year (equivalent of one course credit) of Dance 81 (Repertory), and five full-credit courses including 101 (Introduction to Dance); either 129S (Dance as a Western Theater Art before 1900) or 131S (Modern Dance: History and Theory I) or 133 (History of African American Dance); 135S (Dance Composition); and two additional courses in dance at the 100 level or above. The student is expected to attain and/or maintain the high intermediate level of either modern dance or ballet technique.

Students are urged to enroll in at least one summer session with the American Dance Festival. If appropriate to the student's specific course of study, one course credit earned at the American Dance Festival may be counted toward the certificate requirements.

Through the Duke in New York Arts Program, a student has the opportunity in the fall semester of the junior or senior year to pursue the study of dance in New York City. Appropriate courses taken at New York University may fulfill certificate requirements.

Courses in Technique and Performance

60. Beginning Modern Dance I. A movement course exploring modern dance through technique, improvisation, and composition. No previous dance experience necessary. Half course. *Staff*

61. Beginning Modern Dance II. Prerequisite: Dance 60 or equivalent. Half course. *Staff*

62. Intermediate Modern Dance I. Increased complexity of movement sequences and greater emphasis on clarity of expression and quality of performance. Prerequisite: Dance 61 or equivalent. Half course. *Staff*

63. Intermediate Modern Dance II. Continuation of Dance 62. Prerequisite: Dance 62 or equivalent. Half course. *Staff*

64. Advanced Modern Dance. Prerequisite: Dance 63 or equivalent. Half course. *Staff*

67. Intermediate Tap Dance Technique. Prerequisite: minimum one year of study in tap dance. Half course. *Staff*

68. Ballet Fundamentals. Fundamentals of classical ballet technique concentrating on correct placement and body alignment within the ballet vocabulary. No previous dance experience necessary. Half course. *Dorrance*

69. Elementary Jazz Dance. No previous dance experience required. Half course. *Childs*

70. Elementary/Intermediate Ballet. Barre work concentrating on body alignment and correct placement within the ballet vocabulary followed by center adagio and allegro sequences. Prerequisite: Dance 68 or equivalent. Half course. *Dorrance*

71. Intermediate/Advanced Ballet. Greater complexity of barre and center sequences with increased emphasis on correctness of style and quality of performance. Prerequisite: Dance 70 or equivalent. Half course. *Dorrance*

72. Intermediate Jazz Dance. Prerequisite: Dance 69 or equivalent. Half course. *Childs*

73. Advanced Ballet. Progression of Dance 71 with increased emphasis on line, style, and performance-level quality and technique. Diverse batterie, pirouettes, and tours included in allegro combinations. Prerequisite: Dance 71 or equivalent. Half course. *Dorrance*

79. African Dance Technique. Half course. *Davis*

80. Individual Dance Program: Special Topics. Half course. *Staff*

81. Repertory. The study of choreography and performance through participation in the mounting of a dance work from inception through rehearsal to performance. Consent of instructor required. Variable credit. *Staff*

Theory Courses

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

75. Introduction to Technical Theater. See C-L: Drama 71. One course. *Catotti*

101. Introduction to Dance. (AL) The many facets of dance, specifically dance as a theatre art. Topics include movement analysis, anthropology of dance, modern dance and ballet traditions, choreographic process, critics and dance criticism, training and life of a dancer, and dance and the other arts. The course format includes lecture, discussion, video analysis, and movement sessions. One course. *Dickinson or Sommer*

129S. A History of Ballet before 1900. (AL) A history of European ballet from the time of the Renaissance dancing master through ballet d'action, the Romantic Ballet, and Petipa and classical ballet in Russia. One course. *Dickinson*

131S. Modern Dance: History and Theory I. (AL) Modern dance, through the philosophy and work of its major artists considered in relation to the other arts and the sociopolitical climate of the period 1890 to 1950. One course. *Staff*

132S. Modern Dance: History and Theory II. (AL) See 131S, but from 1950 to the present. One course. *Staff*

133. History of African-American Social Dance Forms of the Twentieth Century. (AL) The evolution of African-American dance styles from the late 1890s to the 1990s in

such dances as the Cakewalk, Charleston, Lindy Hop/Jitterbug through Bebop, Rock'n'Roll, Breaking, Popping, and current Freestyle forms. The influence of these popular forms on stage dance from ballet to jazz, and on movement styles of the younger generation throughout the world. C-L: African and Afro-American Studies 133. One course. *Sommer*

135S. Dance Composition. (AL) The basic elements of movement (time, space, weight, flow) and their choreographic applications explored through structured improvisation, short movement studies, viewing of videotaped dances, and selected readings. Experimentation with devices for movement manipulation and choreographic forms through longer movement studies. Prerequisite: a beginning level dance technique course (modern, ballet, jazz, or African) or consent of instructor. One course. *Childs*

136S. Advanced Dance Composition. (AL) Continuation of the basic elements of movement, choreographic devices and forms explored in 135S. The use of props, sets, lighting and costuming; the relationship of music to dance. Choreographing and directing ensembles. Prerequisite: Dance 135S or consent of instructor. One course. *Childs*

146S. Dancing in the Movies. (AL) Dance styles as they have evolved in American cinema from the choreography of Charlie Chaplin to the geometric chorus lines of Busby Berkeley to the glorious partnership of Astaire and Rogers. The evolution of the musical extravaganzas of such dancers as Gene Kelly and Michael Kidd to the sleek jazz of Bob Fosse and Jerome Robbins, and the choreographed battles of Kung Fu flicks. One course. *Sommer*

151. Functional Anatomy for Dancers. (AL) The functional anatomy of the musculoskeletal system (muscles, bones, and joints) as specifically applied to dance technique approached through observation, analysis, and movement exploration. Concepts of efficient use and questions of misuse of the body in motion or at rest. One course. *Staff*

161. Costume Design. See C-L: Drama 161. One course. *Ma*

169S. Design: Costume, Scene, Lighting. See C-L: Drama 169S. One course. *Gallegos, Ma, and McAuliffe*

177S. Lighting. Prerequisites: Drama 71 and consent of instructor. See C-L: Drama 177S. One course. *Gallegos*

181. Special Topics. Content to be determined each semester. Consent of instructor required. One course. *Staff*

181S. Special Topics. Content to be determined each semester. Consent of instructor required. One course. *Staff*

182S. Choreography. (AL) Advanced study in dance composition designed to develop the student's personal mode of expression. Prerequisites: Dance 135S, Dance 136S, and consent of instructor. One course. *Childs, Dickinson, or Taliaferro*

186S. Stage Management. See C-L: Drama 186S. One course. *Gallegos*

188S. The Diaghilev Ballet, 1909-1929. (AL) The Diaghilev Ballet as a focal point for modernist movements in the arts and a revitalizing force for ballet that brought together choreographers Fokine, Nijinsky, Massine, Nijinska; composers Stravinsky, Ravel, Debussy, Satie; artists Bakst, Benois, Picasso, Braque. Prerequisite: junior or senior standing or consent of the instructor. C-L: Interdisciplinary Course 188S. One course. *Dickinson and staff*

189S. Dance Criticism: From Stage to Page. (AL) The theories and practicalities of how to look at and write about dance performance, ranging from ballet and modern dance to Step shows, clubs, and postmodern performance art. One course. *Sommer*

191, 192. Independent Study. Individual intensive research or creative projects. Consent of instructor required. Half or one course. Variable credit. *Staff*

200. Senior Project. (AL) A research paper, project, or program (with appropriate written documentation) under dance faculty supervision. Open only to seniors earning a certificate in dance. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

65. Beginning Improvisation

130. Inter-Arts: Theory and Practice. (AL)

134. Creative Movement for Children

163. Costume Construction

164. Make-up and Masks

165. Costume Drawing and Rendering

178. Advanced Lighting Design

197. Aesthetics of Twentieth-Century Dance. (AL)

198. Sacred Dance. (AL)

Distinguished Professor Courses (DPC)

Distinguished professor courses enable students, regardless of their majors, to study with some of the most outstanding teachers and scholars within the university. The courses often focus on topics of broad intellectual and academic interest beyond the scope of a single discipline. They may count toward the appropriate distributional requirements as indicated.

188S. Great Books in Biology: Evolution, Genetics, Neurobiology. (NS) Analysis of original texts by great pioneers in biology—Darwin, Mendel, Galton, Claude Bernard, Sherrington, and others. One course. *Diamond*

189S. Building the Brain. (NS) Human brain development; implications of this process for a variety of biological, educational, and social issues. Topics include the organization of the brain into maps and modules; the role of experience in shaping neural connections; the existence of critical periods for learning the development of behavior; and the nature of aging in the brain. Recommended background: Psychology 103, Biology 154, Biology 21L and/or Biology 22L. Open only to juniors and seniors. C-L: Human Development, Neurobiology 189S, Neurosciences, and Psychology 189S. One course. *Puroes*

190S. The Pagan World of the Divine Comedy. (AL) Dante's *Commedia* and the texts that place it in a context: the history of thirteenth-century Florence and Dante's life; his other major works (the *Vita Nuova* and *De Monarchia*); the pagan poets whom Dante incorporated into his *Commedia* (Vergil, Ovid, Lucan, and Statius) and the Christian theory of biblical criticism that gave St. Augustine his perspective on pagan poets. C-L: Classical Studies 116S and Medieval and Renaissance Studies. One course. *Clay*

191. Dante's *Inferno*. (AL) A close study of the text in a bilingual edition. Attention to the historical, political, and theological aspects of the poem. Examples of use of some of the cantos by Joyce, Eliot, and Beckett. Consent of instructor required. One course. *Fowlie*

192. French Existentialism: 1940-1960. (CZ) A critical introduction to the chief positions and controversies of French existentialism. Taught in English. One course. *Mudimbe*

195. Proust, *Remembrance of Things Past*. (AL) In the translation by Kilmartin. The aesthetics of the novel in terms of its structure, characters, and social classes of France. Students who know French will be encouraged to do some of the reading in French. Consent of instructor required. One course. *Fowlie*

196. The French Symbolists and T. S. Eliot. (AL) A study of the poems and theory of Baudelaire, Mallarmé, and Rimbaud. The debt of the symbolists to Poe and their influence on Eliot. Taught in English. Bilingual texts will be used. Consent of instructor required. One course. *Fowlie*

197S. The Family in Christian History. (CZ) Ideas about and practices concerning the family, sexuality, and reproduction, from the first through the twentieth centuries of Christian history. Open to sophomores, juniors, and seniors. Consent of instructor required. C-L: Religion 190S and Women's Studies. One course. *Clark*

198S. The Discovery of the Old World: Utopias Ancient and Modern. (AL) An exploration of utopian literature as it has been generated by voyages of discovery, both ancient and modern. An examination of how such voyages have led to the rediscovery of the old world from the alien perspective of the new, beginning with the voyages of discovery of Columbus, Thomas More's *Utopia*, Montaigne's *On Cannibals*, Shakespeare's *Tempest*, and John Lawson's *A New Voyage to Carolina* (1708). Ancient utopian literature, including the *Odyssey*, Aristophanes' *Birds*, Plato's *Atlantis*, Euhemeros' *Panchaia*, Iamboulos' *Island of the Sun*, and Lucian's *True History*. One course. *Clay*

199S. The Changing Biosphere: Past, Present, and Future. (NS) Interactions between changing global environments through time. The maintenance, evolution, and extinction of biotic systems, including communities. Special emphasis on the nineteenth, twentieth, and twenty-first centuries. Consent of instructor required. C-L: Biology 199S. One course. *Billings*

202S. What It Means to Be Human. (SS) What natural and humanistic sciences, and also philosophy and theology, have to say about the distinctive character of human beings. Prerequisite: junior or senior standing. One course. *Langford*

207S. Topics in Psychobiology. (NS) The biological substrates of human behavior in health and disease. Drug abuse, alcoholism, depression, schizophrenia, and human aggression. Films and videotapes. Student presentations; patient interviews. Prerequisites: senior standing and consent of instructor. C-L: Psychology 207S. One course. *Brodie*

222. Reading Milton. (AL) Milton's epic as a way of exploring some of the questions that have recently been asked about the humanities in general and literary studies in particular. Is the reconstruction of a perspective within which older texts can be responsibly read possible? What do you have to "know" in order to read *Paradise Lost*? What do you have to know in order to know what you have to know to read *Paradise Lost*? Obviously, *Paradise Lost* will be the center of the course, but we shall also read others of Milton's works and look into the tight little world of Milton criticism. C-L: English 222. One course. *Fish*

COURSES CURRENTLY UNSCHEDULED

193S. Handel and Bach: Music for Voice. (AL)

194S. Bach: Master of Style. (AL)

204S. Health Care Law and Policy. (SS)

Documentary Studies

See the chapter "Special Study Centers, Programs, and Opportunities" for information on courses in documentary studies.

Drama Program (DRA)

Professor of the Practice Riddell, *Director of the Program*; Assistant Professor of the Practice McAuliffe, *Director of Undergraduate Studies*; Professors of the Practice Clum and Randall; Assistant Professors of the Practice Blackadder and Ma; Adjunct Assistant Professor of the Practice Catotti; Adjunct Professor Azenberg; Instructors Allen, Gallegos, Hemphill, Lopez-Barrantes, Morris, Storer, and West

A major is available in this program.

The program in drama seeks to educate students in the historical and creative aspects of the theater. Drama courses are designed to give majors a broad background necessary for advanced professional or scholarly work and to offer nonmajors the opportunity to deepen their understanding and appreciation of the theater. Guiding the work of the faculty is the belief that the theater is a collaborative art form that reaches out to other disciplines. Emphasis is placed on classwork, studio projects, and production opportunities. To keep students abreast of the changing nature of theater, resident professionals and visiting artists regularly hold workshops, teach classes, and participate in the production program.

INTRODUCTORY COURSES

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

51. Introduction to Theater. (AL) Study of a broad range of dramatic literature; the process of creating theater in the United States; a fundamental overview of the field of theater. C-L: English 94. One course. *Clum or Riddell*

71. Introduction to Technical Theater. Fundamentals of scenic technology: theater space, tools and hardware, lighting equipment, and reading of plans. Laboratory. C-L: Dance 75. One course. *Catotti*

99S. Beginning Acting: Theory and Practice. (AL) Introduction to the art of acting, beginning with an exploration of the self and the actor's imagination. Storytelling skills; the actor's vocabulary. Analysis of given circumstances, intention and dramatic structure, based on reading and practice. Improvisation, monologues, and scene work. Reserved for first- and second-year students until the end of preregistration. Not open to students who have taken Drama 100. One course. *Allen, Hemphill, Storer, or West*

OTHER UNDERGRADUATE COURSES

101S. Acting: Poetic Realism. (AL) Readings from Ibsen, Chekhov, Strindberg, Williams, and/or O'Neill. Analysis of given circumstances, intention and dramatic structure, based on reading and practice. Use of the script as the primary source for actor choices. Prerequisites: Drama 99S and consent of instructor. One course. *Allen, McAuliffe, or Storer*

102S. Acting: Classical Drama. (AL) Introduction to acting verse drama. Emphasis on text analysis and scansion. Prerequisites: Drama 101S and consent of instructor. One course. *Allen or McAuliffe*

103S. Acting: Contemporary Drama. (AL) Introduction to acting twentieth-century drama. Examination and development of performance choices. Prerequisites: Drama 101S and consent of instructor. One course. *Allen, McAuliffe, or Storer*

105S. Voice and Speech. Vocal production and articulation. Phonetics, control, emotional response, projection, placement, and awareness of regionalisms. Consent of instructor required. One course. *Lopez-Barrantes or Morris*

107S. Movement. Applied body mechanics, tension release, breath, energy flow, relaxation, emotional response, alignment, and physical articulation. Consent of instructor required. One course. *Staff*

111S. Playwriting I. (AL) Fundamentals of writing for stage and screen. Open to sophomores, juniors, and seniors; recommended for, but not limited to, students who have taken English 100B. Prerequisites: a practical theater course (for example, acting, directing, design, stagecraft) and consent of instructor. C-L: English 107S and Film and Video. One course. *Staff*

112S. Playwriting II. (AL) Advanced projects in writing for production. Prerequisites: Drama 111S or English 107S; Drama 99S, 101S, or 181S; and consent of instructor. C-L: English 108S and Film and Video. One course. *Staff*

115, 116. Shakespeare. (AL) See C-L: English 143, 144; also C-L: Medieval and Renaissance Studies. One course each. *DeNeef, Gopen, Jones, Porter, Randall, or Valbuena*

120. Twentieth-Century American Drama. (AL) See C-L: English 162. One course. *Clum*

121. Modern British Drama. (AL) See C-L: English 133. One course. *Clum or Moses*

123. French Drama of the Twentieth Century. (AL, FL) See C-L: French 162. One course. *Tufts*

124S. The Contemporary Theater. (AL) Issues in contemporary United States and world theater: artistic, economic, organizational, and political. Emphasis on exploring current trends and practices in theater today. Prerequisite: junior standing or consent of instructor. One course. *Riddell*

125S. Twentieth-Century Women Playwrights. (AL) Stein, Hellman, Terry, Wertebaker, Egloff, Churchill, Fornes, and others. One course. *McAuliffe*

126. French Drama of the Seventeenth Century. (AL, FL) See C-L: French 148; also C-L: Medieval and Renaissance Studies. One course. *Longino*

130S. Advanced Theater Techniques. Exploration of ensemble movement and mime, improvisation, group ritual, masks, and performance pieces, eventually culminating with a production (class) created by students and instructor. Not open to students who completed Drama 49S, Group Theater Techniques. Consent of instructor required. One course. *Staff*

131S. Film and Video Theory and Practice. (AL) Prerequisite: Drama 132, English 101A, or Literature 177. See C-L: English 183S; also C-L: Film and Video. One course. *Staff*

132. Introduction to Film. (AL) See C-L: English 101A; also C-L: Film and Video. One course. *Gaines*

136. Studies in Film History. (AL) See C-L: English 185; also C-L: Film and Video and Literature 187. One course. *Clum, Gaines, or Jameson*

137. Melodrama and Soap Opera. (AL) See C-L: English 187. One course. *Clum or Gaines*

141. Production and Internship. Project work that may begin in the freshman year and extend through graduation, including practical involvement in four different areas

of Drama Program productions, participation in Drama Program symposia and other program activities, successful execution of drama major guidelines, completion of an approved internship. Offered only on the pass/fail basis. (Drama majors must have completed or be completing concurrently all other drama major requirements). Prerequisite: Drama 71. No credit. *Calotti*

148S. Text and Performance. (AL) (London summer program.) See C-L: English 176S. One course. *Clum*

149S. Drama in Performance. (AL) (London summer program.) See C-L: English 134S. One course. *Clum*

151. Drama and Theater from 1590 to 1700. (AL) Drama and theater in England, France, and Spain from Marlowe to the end of the Restoration. Plays by Shakespeare, Jonson, Webster, Ford, Farquhar, Dryden, Wycherly, Congreve, Molière, Racine, Corneille, deVega, and Calderon. Scene work from each period. C-L: English 174A and Literature 173. One course. *Blackadder, Clum, or Randall*

152. World Theater: Realism and Modernisms. (AL) Ibsen, Strindberg, Chekhov, Shaw, Pirandello, Brecht, Lorca, and other leading modern playwrights through 1960. C-L: English 174B and Literature 174. One course. *Blackadder, Clum, or Riddell*

154. Shakespeare and the Theater. (AL) A study of ten Shakespearean plays as blueprints for production. Shakespearean production: history and problems. Includes scene work. C-L: English 130. One course. *Clum or Randall*

155. Drama of Greece and Rome. (AL) See C-L: Classical Studies 106. One course. *Burian or Clay*

156. The Italian Theater. (AL, FL) Taught in Italian. See C-L: Italian 151. One course. *Finucci*

157S. Chekhov. (AL) See C-L: Russian 177S; also C-L: Comparative Area Studies. One course. *Flath or staff*

161. Costume Design. Basic costume design principles and aesthetic concepts. Emphasis on presentation of design approach via sketches, collages, and swatches. Play analysis, design research, concept development, and color control leading to design solutions. Selected periods of costume history. C-L: Dance 161. One course. *Ma*

167. Asian Art and Theater. (AL) The social, philosophic, and artistic content of Asian visual arts and their relationship to theater from historical and practical points of view. C-L: Asian and African Languages and Literature 167. One course. *Ma*

169S. Design: Costume, Scene, Lighting. Design principles for theater. Presentation of theatrical concepts via drawings and models. Projects prepared for criticism, with emphasis on play analysis, research, sketches, models, and ground plans. Focus on collaborative processes leading to design solutions. C-L: Dance 169S. One course. *Gallegos, Ma, and McAuliffe*

171S. Advanced Stagecraft. Advanced methods and tools of scenery construction. Emphasis on welding, brazing, furniture repair. Laboratory. Prerequisites: Drama 71 and consent of instructor. One course. *Calotti*

172S. Scene Design I. Aesthetics and skills of designing scenery for theater. Emphasis on design projects and problem solving. Introduction to drawing and color. Prerequisite: Drama major standing or consent of instructor based on portfolio review. One course. *Ma*

173S. Scene Design II. Advanced applications. Prerequisite: Drama 172. One course. *Ma*

175S. Advanced Topics in Stagecraft. Problem solving of theater technology. Solutions to problems such as interior theater architectural design, stage elevator systems, and tracking. Prerequisites: Drama 71 and consent of instructor. One course. *Catotti*

177S. Lighting. History, fundamentals of electricity, instrumentation, light plots, aesthetics, and design problems. Prerequisites: Drama 71 and consent of instructor. C-L: Dance 177S. One course. *Gallegos*

179. The History of Performance Art. (AL) See C-L: Art 179; also C-L: Comparative Area Studies, Literature 176, and Women's Studies. One course. *Stiles*

181S. Directing I. (AL) Establishment of basic skills of information communication from script to stage to audience; analyzing texts from a director's point of view; basic stage articulation of viewpoint; development of skills in mechanics and staging techniques. Emphasis on scripts of poetic realists. Prerequisites: Drama 51 or 99S and consent of instructor. One course. *McAuliffe or Storer*

182S. Directing II. (AL) Examination of rehearsal working methods and development of performance choices with emphasis on modern and contemporary scripts. Includes practicum with actors. Prerequisites: Drama 181S and consent of instructor. One course. *McAuliffe*

183S. Directing III. (AL) Examination of rehearsal working methods and development of performance choices with emphasis on verse drama. Prerequisites: Drama 182S and consent of instructor. One course. *McAuliffe*

185S. Theater Administration. History and principles of running the theater and managing the production. Emphasis on theater organization, theater types (commercial, not-for-profit, regional), and involvement with other entities (unions, investors, philanthropic bodies). One course. *Gallegos*

186S. Stage Management. Fundamentals: methods and procedures of rehearsal and performance organization. Project experience. Preparation of production books, rehearsal and performance logs. In the context of the American professional theater. C-L: Dance 186S. One course. *Gallegos*

187. Broadway Production. Aspects of producing Broadway shows, from script-selection to final production, and including marketing techniques. Half course. *Azenberg*

191, 192, 193, 194. Independent Study. Individual intensive research or creative projects. Half or one course. Consent of instructor required. Variable credit. *Staff*

195, 196. Special Topics. Illustrative examples: specific writers or other theater artists, media studies, styles, mime, masks, clowns, stage fighting, newspaper criticism, studies of the profession, audition techniques, and theater periods. May be taken more than once. Half course, one course, respectively. *Staff*

195S, 196S. Special Topics. Seminar versions of Drama 195 and 196. May be taken more than once. Half course, one course, respectively. *Staff*

197S. Special Topics in Film. (AL) Prerequisite: Drama 132 or English 101A. See C-L: English 189S; also C-L: Film and Video. One course. *Clum, Gaines, or Moses*

220S. German Theater as Anti-Drama. (AL, FL) See C-L: German 233S. One course. *Alt*

225. Renaissance Drama: 1500 to 1642. (AL) See C-L: English 225; also C-L: Medieval and Renaissance Studies. One course. *Randall*

COURSES CURRENTLY UNSCHEDULED

- 109S. Acting for Camera**
- 110. Inter-Arts: Theory and Practice. (AL)**
- 113S. Screenwriting. (AL)**
- 114S. Mime. (AL)**
- 117S. Commedia dell' Arte. (AL)**
- 118. Absurdist and Postmodern Drama. (AL)**
- 122. French Comedy. (AL, FL)**
- 135. Narrative Film and the Novel. (AL)**
- 138. American Film Genres. (AL)**
- 139. Television, Technology, and Culture. (AL)**
- 145S. Theater Farce. (AL)**
- 162. Costume Techniques**
- 163. Costume Construction**
- 164. Make-up and Masks**
- 165. Costume Drawing and Rendering**
- 166. Costume History. (CZ)**
- 174. Drafting for the Theater**
- 176. Scene Painting**
- 178. Advanced Lighting Design**

THE MAJOR

The major in drama offers students a grounding in (1) the history of theater and dramatic literature, and (2) the interrelated disciplines of the art of theater, for example, acting, design, directing, playwriting, and technical production. Students completing the major will be prepared for either graduate study, advanced theater training, or entry-level work in the profession.

Prerequisites. Drama 51, 71, and 99S.

Major Requirements. Drama 151S,* 152,* 181S; 161, 169S, 172S, or 177S; 141; plus three additional 100-level courses in the program.

Honors/Distinction

Students pursuing Latin honors in drama must have a 3.3 cumulative grade point average. They should contact the director of undergraduate studies during the semester prior to their last two semesters to propose a project and name a project supervisor (a full-time faculty member in the area in which the student will pursue the honors project). This project may be an extended research paper in dramatic literature, theory, criticism,

*Drama 151S or 152 may be replaced by Drama 148S or Drama 149S, taught during the summer in the London Program.

or theater history; a play in playwriting; a performance and production book in acting; a production and production book in directing. The director of undergraduate studies and the proposed project supervisor will consider the project for approval. The director of undergraduate studies will contact the program director for approval when the project will culminate in a production. After receiving approval from the director of undergraduate studies and the supervisor, the student will register for Drama 193 (one course) with the supervisor during the first semester of the final year and Drama 194 (one half course—weekly tutorial with the supervisor) during the final semester. The project will be evaluated by the supervisor and the director of undergraduate studies.

Students pursuing distinction must have a *B* average in drama to be eligible. All other procedures are the same as for Latin honors.

Ecology

For courses in ecology, see Biology, Environment (School), and Environmental Sciences and Policy Program.

Economics (ECO)

Professor De Marchi, *Chair*; Professor Tower, *Director of Undergraduate Studies*; Professors Clotfelter, Cook, Goodwin, Grabowski, Graham, Havrilesky, Kelley, Kimbrough, Ladd, McElroy, Moulin, Sloan, Smith, Tauchen, Trembl, Vernon, Viscusi, Weintraub, and Yohe; Associate Professors Conrad, Kramer, Leitzel, and Marshall; Assistant Professors An, Gentry, Hamilton, Peretto, and Yang; Professors Emeriti Blackburn, Bronfenbrenner, Davies, Kreps, and Wallace; Research Professor Burmeister; Adjunct Professor Gallant; Adjunct Associate Professor Zarkin; Visiting Assistant Professor Ramachandran

A major is available in this department.

Economics courses develop the critical and analytical skills essential for understanding economic problems and institutions, in both their contemporary and historical settings. Although no particular vocational or professional goal is emphasized, these courses provide the academic background necessary for positions in industry, for work in many branches of government service, for law school, and for graduate study in business administration, economics, and the social sciences.

Students planning to do graduate work in economics are advised to take as many of the following courses in mathematics (listed in preferential order) as their schedules permit: Mathematics 31, 32, 103, 104, 131, 135, and 136.

1D. National Income and Public Policy. (SS) Basic economic analysis emphasizing current public policy issues. Means of determining the level and rate of growth of aggregate national income and output. Causes of unemployment, inflation, and international payment problems. The effects of monetary policy (money supply and interest rates) and fiscal policy (government expenditures and taxes) on these problems. For freshmen; upperclassmen only by consent of instructor. One course. *Staff*

2D. Competition, Monopoly, and Welfare. (SS) The composition of output and the distribution of income in a market economy. Role of government. Contemporary problems. Topics such as environmental economics, monopoly, unionism, international trade. Comparison of a market economy with other systems of economic organization. Economic problems of developing countries. Open only to freshmen. One course. *Staff*

2S. Competition, Monopoly, and Welfare. (SS) Seminar version of Economics 2D. Open only to freshmen. Consent of instructor required. One course. *Weintraub*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

51D. National Income and Public Policy. (SS) For description see Economics 1D. Open to all students. May be taken before or after Economics 2D or 52D. One course. *Staff*

52D. Competition, Monopoly, and Welfare. (SS) For description see Economics 2D. Open to all students. May be taken before or after Economics 1D or 51D. One course. *Staff*

53. Economics of Contemporary Issues. (SS) Modern economic problems, such as environmental deterioration and urban decay. The market as one of the interrelated subsystems of the social system, from institutionalist, Marxist, and other perspectives in the social sciences. One course. *Staff*

55. Introductory Financial Accounting. (SS) Does not count for economics major requirements. The accounting model of the firm and transactions analysis. Topics include the procedures used to process accounting data, issues in asset valuation and income determination, and financial statement analyses. Not open to students who have taken Management Sciences 53. Prerequisite: sophomore standing. One course. *Staff*

60. Economics of a United Europe. (SS) The impact of common European monetary policy; implications of common welfare standards for the competitiveness of the countries on the periphery, such as Spain and Portugal; unemployment problems and migration issues. Available only in the Duke in Berlin Fall Program. One course. *Staff*

65. Japanese Business Management. (SS) Topics include production, labor management, finance, and accounting. Classroom lectures and discussions supplemented by several field trips. (Taught in Japan.) One course. *Fukuda*

69. Australia and the Asia-Pacific Economies. (SS) Economic growth, development, immigration, foreign investment, deregulation, privatization, tax reform, and financial liberalization in Australia and the Asia-Pacific. ASEAN. Available only in the Duke-in-Australia Program. C-L: Comparative Area Studies. One course. *Lodewijks*

98. Introduction to Canada. (SS) Does not count for economics major requirements. See C-L: Interdisciplinary Course 98; also C-L: Canadian Studies, Comparative Area Studies, History 98, Political Science 98, and Sociology 98. One course. *LeClerc or Thompson*

108. Economics of War. (SS) Conflict theory, causes and economic consequences of war, military personnel, military-industrial complex, disarmament, and the economy. Prerequisite: Economics 2D or 52D. One course. *Weintraub*

130. The Changing Role of the Market in the Social System. (SS) Comparison of the different perspectives on the role of the market in the social system, from libertarian to Marxian. Application of the tools of analysis of market behavior to seemingly noneconomic problems such as crime and environmental decay. Prerequisites: Economics 1D or 51D, and 2D or 52D. One course. *Havrilesky*

133. The Evolution of the American Economy. (SS) The process of industrialization and modernization in the United States from the pre-Civil War period to the present. Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. One course. *Staff*

134. Japanese Economy and Its History. (SS) Japanese economic development since the end of isolation, in the mid-nineteenth century. Prerequisite: one course in economics or Far Eastern history. One course. *Bronfenbrenner*

137. Managerial Accounting. (SS) Does not count for economics major requirements. The use of accounting information by management in short-term planning, control, and decision making in business enterprises. Cost accumulation, cost analysis, cost estimation, the development of standards, introduction to budgeting, and short-run

decisions. Not open to students who have taken Management Sciences 137. Prerequisite: Economics 55 or consent of instructor. One course. *Staff*

139. Introduction to Econometrics. (QR) Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. Prerequisites: Economics 2D or 2S or 52D, Mathematics 32 or equivalent, and statistics. One course. *Marshall, McElroy, Tauchen, or Wallace*

140. Comparative Economic Systems. (SS) A strategic analysis of the new economics of the Soviet Union, China, and Eastern Europe as well as the socioeconomic, political systems of the United States, Japan, Sweden, and other capitalistic countries. Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. C-L: Comparative Area Studies. One course. *Trembl*

142S. Chinese Economy in Transition. (SS) Evolution of the Chinese economy since 1949. Exposition of alternative economic systems, the commune, incentive problems and state enterprises. Analysis of recent reforms and their effects on economic efficiency: agricultural growth, changes in ownership structures, financial markets, reforms and inflation, privatization, gradualism and shock treatment. Through a research project students develop expertise in one aspect of the Chinese economy. Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. C-L: Public Policy Studies 142S. One course. *Yang*

144. Education, Development, and Growth. (SS) The basic elements of human capital theory and its application to economic growth and development. Topics include human capital investment, life-cycle earnings, impact of education on farm efficiency, migration, national income accounting, and models of endogenous growth. Data from the United States and other countries used to test theoretical implications. Prerequisites: Economics 149, Economics 154, and Statistics 110B. One course. *Yang*

145. The Soviet Economy and Its Collapse. (SS) Historical development and structure of command-administrative system. Gorbachev's perestroika. The transition from plan to market. One course. *Trembl*

149. Microeconomic Theory. (SS) Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. Not open to students who have had Public Policy Studies 110. Prerequisites: Economics 2D or 2S or 52D, and Mathematics 31. One course. *Graham, Trembl, or Vernon*

150. History of Economic Thought. (SS) Approaches to economic problems from Aristotle to Keynes, emphasizing certain models and doctrines—their origins, relevance, and evolution. Readings from Mun, Quesnay, Adam Smith, Malthus, Ricardo, Marx, Walras, Veblen, and Keynes. Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. C-L: Comparative Area Studies. One course. *De Marchi or Goodwin*

151. Adam Smith and the System of Natural Liberty. (SS) The writings of Adam Smith, including close readings of *The Wealth of Nations* and *The Theory of Moral Sentiments*. Focus on the natural and social context of late eighteenth-century economic ideas, connections with earlier and later thinkers, including Quesnay, Ricardo, Mill, and Marx. C-L: Comparative Area Studies. One course. *De Marchi*

152. Mercantile Culture and Art in the Netherlands. (CZ) See C-L: Art 155. One course. *De Marchi and Van Miegroet*

153. Monetary Economics. (SS) The evolution and operations of commercial and central banking and nonbanking financial institutions in the United States, the determination of monetary aggregates and interest rates, the financial impacts of Treasury operations, and the linkages from Federal Reserve actions to price level, employment,

economic growth, and balance of payments objectives. Prerequisite: Economics 154. One course. *Havrilesky or Yohe*

154. Aggregate Economics. (SS) Concepts and measurement of national income and expenditures, employment, interest rates, and price levels; the theoretical determination of these aggregates; applications of macroeconomic theory to business cycles and economic growth. Prerequisites: Economics 1D or 51D, 2D or 2S or 52D, and Mathematics 31. One course. *De Marchi, Havrilesky, Kimbrough, Tower, or Yohe*

155S. Labor Economics: Analysis and Measurement. (SS) Labor market equilibria. The demand for labor. The supply of labor: human fertility, human capital, hours of work, and labor force participation. Wage levels and differences. Union and government as labor market factors. Prerequisites: Economics 149, Mathematics 31, and statistics. One course. *McElroy or Yang*

156. Health Economics. (SS) Economic aspects of the production, distribution, and organization of health care services, such as measuring output, structure of markets, demand for services, supply of services, pricing of services, cost of care, financing mechanisms, and their impact on the relevant markets. Prerequisite: Economics 149. One course. *Sloan*

157S. Business Cycles and Economic Forecasting. (SS) Causes of fluctuations in economic activity and conventional methods of forecasting micro- and macroeconomic variables, using microcomputer programs. Forecasting projects by students. Prerequisites: Economics 149, 154, and statistics. One course. *Yohe*

158. Financial Markets and Investments. (SS) The tools learned in microeconomics, macroeconomics, basic mathematics, and statistics applied to problems in financial economics. A blend of pure economic theory, an investigation of financial data, and practical applications using personal computers. Prerequisites: Economics 149, Economics 154, and a statistics course—preferably Statistics 110B or 210B. One course. *Burmeister*

160. Nonrenewable Resource Economics and Public Policy. (SS) Prerequisite: Economics 149. See C-L: Public Policy Studies 160. One course. *Conrad*

161S. Economics of Slavery in the American South. (SS) Examines how modern economic analysis is helpful in understanding the nature and development of a slave economy, society, and culture. Combines the study of economic development and comparative economic systems. Prerequisite: Economics 149. C-L: African and Afro-American Studies 161S and History 140S. One course. *Staff*

163. Economics of the Environment. (SS) Role of economic methods in evaluating the use and abuse of environmental resources. Focus on characteristics of resources that influence efficient allocation decisions. Current case studies used to develop relevant microeconomics such as natural resource damage assessment, auctions for pollution permits, trade, and the environment. Prerequisite: Economics 52. One course. *Smith*

165. American International Economic Policy. (SS) Topics include United States trade policies and protectionism, the North American Free Trade area, trade and economic relations with industrialized countries, policies toward developing countries and multilateral institutions, macroeconomic policy coordination, and relations with Europe. Prerequisites: Economics 1D or 51D and 2D or 2S or 52D. C-L: Public Policy Studies 165. One course. *Bronfenbrenner*

171S. Behavioral and Experimental Economics. (SS) The relationship between actual behavior and economic models. Topics include individual decision-making behavior, game theory, and the role of market institutions. The interaction of economic and psychological theory. Students have the opportunity to participate in, and conduct,

economic experiments. Prerequisite: Economics 149 or consent of instructor. One course. *Staff*

173. Economics of Organization and Management. (SS) Coordination and motivation issues within a corporation along with the internal design and dynamics of organizations. Topics include the structure of employment contracts, performance incentives, and the pricing of financial assets. Prerequisite: Economics 149. One course. *Marshall*

✓ **180. Law and Economics. (SS)** An introduction to the economic analysis of legal issues and legal reasoning. Case studies in accident law, product liability, and the value of life. Other topics include contracts, property, affirmative action, civil procedure, and the economics of criminal behavior. Prerequisite: Economics 149. One course. *Viscusi*

181. Corporate Finance. (SS) Major corporate decisions from the perspective of the firm with an emphasis on the interaction of the firm with financial markets: project evaluation for investment, choice between borrowing and issuing stock, dividend policy, organizational form (for example, mergers and acquisitions). Introduction to financial markets: issuing stocks, analyzing financial performance, and options. Prerequisites: Economics 1D or 51D, 2D or 52D; and some statistics recommended. One course. *Gentry*

184S. Canadian Issues. (SS) Does not count for economics major requirements. Prerequisite: Interdisciplinary Course 98 or consent of instructor. See C-L: Interdisciplinary Course 184S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 184S, History 184S, Political Science 184S, and Sociology 184S. One course. *Staff*

185S. The Canadian Health Care System. (SS) Does not count for economics major requirements. See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 185S, History 108E, Political Science 185S, Public Policy Studies 187S, and Sociology 185S. One course. *Boychuck or LeClerc*

187. Public Finance. (SS) Economic aspects of the allocative and distributive role of government in the economy, the incidence and efficiency of taxation, the effects of taxation on behavior, and analysis of major government spending programs. Prerequisite: Economics 149. One course. *Gentry*

188. Industrial Organization. (SS) Economic theories of the behavior of firms within industries. Emphasis upon incentives and the role of information when firms are mutually interdependent. Topics include the agency problem, entry, research and development, collusion, and various pricing schemes. Analysis conducted within a number of regulatory environments. Prerequisites: Economics 149 and statistics, or consent of instructor. One course. *Marshall*

189. Business and Government. (SS) Public policies which most directly affect the operation of competition in the business world. The economic basis for an evaluation of antitrust policy, public utility regulation, and public enterprise. Prerequisites: Economics 149 and statistics, or consent of instructor. One course. *Grabowski or Vernon*

191, 192. Independent Study. Directed reading and research. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

193, 194. Independent Study. Same as Economics 191, 192, but for seniors. One course each. *Staff*

199. Political Philosophy and Distributive Justice. (SS) Welfarism: classical utilitarianism versus egalitarianism (Harsanyi versus Rawls). Democratic rights: voting rules and preference aggregation (Arrow's theorem). Liberalism: competitive equilib-

rium, destructive competition, and inefficient decentralization. Welfarism versus resourcism. Mechanism design and the microeconomic approach to justice. Prerequisites: Economics 1D or 51D and Economics 2D or 52D. C-L: Political Science 175A. One course. *Moulin*

For Advanced Undergraduates and Graduates

205S. Advanced Monetary Theory and Policy. (SS) The theory of monetary policy from Keynesian, neoclassical and classical perspectives. Public choice and political economy approaches to monetary policy. The term structure interest rates. Portfolio theory. The theory of the financial services firm. Theories of financial regulatory policy. Prerequisites: Economics 153 and Statistics 10D. One course. *Havrilesky*

207. Models of Conflict and Cooperation. (SS) Cooperative and noncooperative game theory with applications to trading, imperfect competition, cost allocation, and voting. Prerequisites: Economics 149 and Mathematics 31. One course. *Moulin*

208S. Economics of the Family. (SS) Economic functions of families including home production gains from marriage, the demand for children, marriage and divorce, child support and alimony, labor supplies of women and men, the distribution of resources within families ("rotten kid theorems" and cooperative and noncooperative games). Applications to marriage and divorce law, day care, U.S. welfare policy, mortality, and farm efficiency in developing nations. Prerequisites: Economics 149 and Statistics. One course. *McElroy*

215S. Applied Cost Benefit Analysis. (SS) The principles of economic cost benefit analysis applicable to circumstances in which market valuations do not provide adequate measures of social desirability. Socially relevant prices for labor, capital, energy, materials, foreign exchange, and valuation of public goods. Development of analysis for individual projects, extended to cover economic policies. Prerequisite: Economics 149. One course. *Staff*

216S. Economics of Education. (SS) Topics include investment in human capital, return to and demand for education, the production function for schooling, public expenditures on schools, effectiveness of private and public schools, the distribution of public educational expenditures, public financing of higher education, inflation in college costs, and labor markets for teachers and professors. Emphasis on students' research projects. Prerequisite: Economics 149 or Public Policy Studies 110. C-L: Public Policy Studies 216S. One course. *Clotfelter*

218. Macroeconomic Policy. (SS) Does not count for undergraduate economics major requirements. See C-L: Public Policy Studies 218. One course. *Leitzel or McElroy*

219S. Economic Problems of Underdeveloped Areas. (SS) Analysis of underdeveloped countries with attention to national and international programs designed to accelerate development. Prerequisite: Economics 149 or consent of instructor. C-L: Comparative Area Studies. One course. *Kelley or Wallace*

220S. Computer Modeling for Policy Analysis. (SS) Introduction to the use of computer techniques in economic policy evaluation; policy applications to international economics, public finance and development economics; computer analysis of linearized and nonlinear models. Students required to complete a major modeling project. Prerequisites: Economics 149 and Economics 154. One course. *Tower*

225S. Games and Information. (SS) Non-cooperative game theory with emphasis upon incomplete/imperfect information and incentive contracting. Applications to insurance (deductibles, coinsurance), labor (piece rates, sharecropping, profit sharing), real estate (commission sales), and law (contingent contracts). Prerequisites: Economics 149 and statistics. One course. *Graham*

234. Japanese Economy and Its History. (SS) Japanese economic development since the end of isolation, in the mid-nineteenth century. Not open to students who have had Economics 134. Prerequisite: one course in economics or Far Eastern history. One course. *Bronfenbrenner*

239. Introduction to Econometrics. (QR) Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. (Same as Economics 139 but requires additional term paper; not open to students who have taken Economics 139.) Prerequisites: Economics 2D or 2S or 52D and Mathematics 32 or equivalent and Statistics 10D or equivalent. One course. *McElroy, Tauchen, or Wallace*

240. Comparative Economic Systems. (SS) Analysis and comparison of basic economic systems; market versus centrally planned economies; decision making, information, property rights (income and control), and incentives. Western industrialized market economies compared with Soviet-type command economies. Analysis of change, reforms, and of economic problems of systems transformation. Not open to students who have taken Economics 140. Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. C-L: Comparative Area Studies. One course. *Trembl*

242S. Chinese Economy in Transition. (SS) Evolution of the Chinese economy since 1949. Exposition of alternative economic systems, the commune, incentive problems and state enterprises. Analysis of recent reforms and their effects on economic efficiency: agricultural growth, changes in ownership structures, financial markets, reforms and inflation, privatization, gradualism and shock treatment. Through a research project students develop expertise in one aspect of the Chinese economy. (Same as Economics 142S but requires additional paper; not open to students who have taken Economics 142 or 142S.) Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. C-L: Public Policy Studies 242S. One course. *Yang*

244. Education, Development, and Growth. (SS) The basic elements of human capital theory and its application to economic growth and development. Topics include human capital investment, life-cycle earnings, impact of education on farm efficiency, migration, national income accounting, and models of endogenous growth. Data from the United States and other countries are used to test theoretical implications. (Same as Economics 144 but requires additional work; not open to students who have taken Economics 144.) Prerequisites: Economics 149, Economics 154, and Statistics 110B. One course. *Yang*

249. Microeconomics. (SS) Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. (Similar to Economics 149 but at a more advanced level; not open to students who have taken Economics 149.) One course. *Graham, Trembl, or Vernon*

250S. Modern Economic Thought. (SS) Selective survey of themes in economic thinking since 1936, including the role of empirical work and of formalization. Prerequisites: Economics 149, 154, and Statistics 10D or consent of instructor. One course. *De Marchi or Weintraub*

251S. Regulation of Vice and Substance Abuse. (SS) Prerequisite: Economics 149 or Public Policy Studies 110. See C-L: Public Policy Studies 251S. One course. *Cook*

253. Econometric Methods. (QR) Econometric and statistical methods for applied economic research. Topics include multivariate regression, hypothesis testing, mean square error criteria, and related subjects. Prerequisites: Economics 139 or 239, Economics 149, or equivalents. Calculus and matrix algebra recommended. One course. *Wallace*

254. Macroeconomics. (SS) Concepts and measurement of national income and expenditures, employment, interest rates, and price levels; the theoretical determination of these aggregates; applications of macroeconomic theory to business cycles and economic growth. (Similar to Economics 154 but at a more advanced level; not open to students who have taken Economics 154.) One course. *De Marchi, Haorilesky, Kimbrough, Tower, or Yohe*

258. Financial Markets and Investments. (SS) The tools learned in microeconomics, macroeconomics, basic mathematics, and statistics applied to problems in financial economics. A blend of pure economic theory, an investigation of financial data, and practical applications using personal computers. Not open to students who have had Economics 158. Prerequisites: Economics 149, Economics 154, and a statistics course—preferably Statistics 110 or 210. One course. *Burmeister*

259S. State and Local Public Finance. (SS) Prerequisite: Public Policy Studies 217 or equivalent. See C-L: Public Policy Studies 259S. One course. *Ladd*

260. Economic Policy Analysis of Nonrenewable Resources. (SS) Prerequisite: Economics 149, Public Policy Studies 110, or Public Policy Studies 232. See C-L: Public Policy Studies 260. One course. *Conrad*

261. Evaluation of Public Expenditures. (SS) Not open to students who have taken Economics 285. See C-L: Public Policy Studies 261; also C-L: Environment 272. One course. *Conrad*

262S. Seminar in Applied Project Evaluation. (SS) Prerequisite: Economics 285 or Public Policy Studies 261. See C-L: Public Policy Studies 262S. One course. *Conrad*

263. Environmental Economics: Theory and Application. (SS) Role of materials and energy balances in modeling production and consumption; externalities and Pigouvian taxes; property rights and open access resources; role of market structure; design of policy instruments and actual practice; contrasts between domestic and international environmental policies. Prerequisite: Economics 149. One course. *Smith*

265. International Trade and Finance. (SS) Fundamental principles of international economic relations. The economic basis for international specialization and trade, the economic gains from international trade and investment, the balance of payments, international finance, and the international monetary system. Prerequisites: Economics 149 and 154. C-L: Canadian Studies. One course. *Kimbrough or Tower*

266S. Current Issues in International Economics. (SS) Emphasis on individual research projects. Prerequisite: Economics 165, 265, or consent of instructor. One course. *Kimbrough or Tower*

269. Microeconomic Analysis. (SS) The basic tools for using microeconomic analysis to address practical economic problems. Topics include consumption, production, externalities, partial equilibrium, and general equilibrium. Applications drawn from labor markets, public goods, cost/benefit analysis, and optimal taxation. The level of the course is between intermediate microeconomics (Economics 149/249) and the core Ph.D. microeconomics sequence (Economics 301/302). One course. *Yang*

270L. Resource and Environmental Economics. (SS) Includes laboratory. Prerequisite: introductory course in microeconomics. See C-L: Environment 270L; also C-L: Public Policy Studies 272L. One course. *Kramer*

271S. Behavioral and Experimental Economics. (SS) The relationship between actual behavior and economic models. Topics include individual decision-making behavior, game theory, and the role of market institutions. The interaction of economic and psychological theory. Students will have the opportunity to participate in, and

conduct, economic experiments. (Same as Economics 171 but requires an additional paper; not open to students who have taken Economics 171.) Prerequisite: Economics 149 or consent of instructor. One course. *Staff*

272. Economic Analysis of Resource and Environmental Policies. (SS) Prerequisite: Environment 270L or equivalent; Economics 149 recommended. See C-L: Environment 271. One course. *Staff*

273. Economics of Organization and Management. (SS) Coordination and motivation issues within a corporation along with the internal design and dynamics of organizations. Topics include the structure of employment contracts, performance incentives, and the pricing of financial assets. (Same as Economics 173 but requires additional paper; not open to students who have taken Economics 173.) Prerequisite: Economics 149. One course. *Marshall*

280S. Fundamentals of Political Economy. (SS) See C-L: Political Science 270S. One course. *Aldrich, Bianco, or Niu*

282S. Canada. (SS) See C-L: History 282S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 282S, Interdisciplinary Course 282S, Political Science 282S, and Sociology 282S. One course. *Staff*

286S. Economic Policy-Making in Developing Countries. (SS) See C-L: Public Policy Studies 286S; also C-L: Comparative Area Studies. One course. *Conrad or Ramachandran*

287. Public Finance. (SS) Economic aspects of the allocative and distributive role of government in the economy, the incidence and efficiency of taxation, the effects of taxation on behavior, and analysis of major government spending programs. Not open to students who have had Economics 187. (Taught concurrently with Economics 187 but requires additional graduate-level work.) Prerequisite: Economics 149. One course. *Gentry*

288S. Current Issues in United States Federal Tax Policy. (SS) Evaluation of the equity and efficiency of United States tax policy. Topics include: (1) personal consumption versus income taxation and (2) restructuring the taxation of corporate income. Emphasis on the effects of taxes on savings, investment, and the international economy. Prerequisite: Economics 149 or consent of instructor. C-L: Public Policy Studies 288S. One course. *Gentry*

292S. Issues in the Transition of Economic Systems. C-L: Comparative Area Studies. One course. *Leitzel*

293S. Soviet Economic History. (SS) From 1917 through the present. Foundations of the command economy—rejection of markets, central planning, industrialization, collectivization of agriculture; economic reforms and search for economic efficiency. Gorbachev's perestroika and the dissolution of the Soviet Union. C-L: Comparative Area Studies. One course. *Trembl*

294S. Soviet Economic System. (SS) Economic planning and administration in the Soviet Union. Theoretical and applied problems of resource allocation, economic development, and optimal micro decision making in a nonmarket economy. Gorbachev's perestroika, search for a new model, and the collapse of the Soviet system. C-L: Comparative Area Studies. One course. *Trembl*

Honors Seminars (by invitation only)

201S, 202S. Current Issues in Economics. (SS) Economic analysis of such issues as the health care system, crime and punishment, pollution and the environment, the

performing arts, welfare, and the energy crisis. Prerequisites: for 201S, Economics 149 and statistics; for 202S, Economics 201S. One course each. *Weintraub*

206S. Regulation and Industrial Economics. (SS) Analysis of industrial competition and performance in industries such as automobiles, telephones, cable TV, airlines, pharmaceuticals, tobacco, and health care services. Analysis of the efficiency of regulation and other public policy programs. Prerequisites: Economics 149 and statistics. One course. *Grabowski*

209S. Economics of Population. (SS) Relationship of population growth to economic development and to natural resource and environmental pressures. Causes and impacts of population change, including economic models of fertility, mortality, marriage, and migration. Prerequisites: Economics 149 and 154. One course. *Kelley*

212S. Economic Science and Economic Policy. (SS) An historical and contemporary examination of the impact of economics on public policy. Topics vary each semester and have included energy and anti-inflationary policy, productivity growth, the Third World, and the Council of Economic Advisers. Different sources of economic ideas in the policy process. Prerequisites: Economics 149, 154, and consent of instructor. One course. *Goodwin*

COURSES CURRENTLY UNSCHEDULED

132. Introduction to Economic History. (SS)

169, 170. Microeconomic Analysis I and II. (SS)

198S. Economics of Regulation. (SS)

203S. Mathematical Economics. (SS)

207S. Models of Conflict and Cooperation. (SS)

211S. Current Problems in Aggregate Supply. (SS)

224S. Economics of the Law. (SS)

231S. Economic Development in Latin America. (SS)

235. The Economics of Crime. (SS)

THE MAJOR

Prerequisites. Mathematics 31, Economics 1D or 51D, and Economics 2D or 2S or 52D, and an approved statistics course more advanced than Statistics 10. The best statistics course for most economics majors is Statistics 110B. (Statistics courses currently acceptable include Psychology 117, Public Policy Studies 112, Sociology 133, and Statistics 110A, 110B, 112, 114, 210B, 213, and 215.)

Major Requirements. Economics 149, 154, and any three additional 100- or 200-level courses. Substitution of similar courses in other departments for courses in the economics department will not be permitted.

Honors/Distinction

For graduation with departmental distinction at least one honors seminar and an honors paper are required. Prerequisites for admission to an honors seminar, upon invitation to take such a seminar extended by the director of the Honors Program (Professor Goodwin), are two of the following courses: Economics 149, 154, and an approved statistics course. For Latin honors by honors project the student must meet the same grade point average requirements as for graduation with distinction, take an approved 200-level course in economics and complete a research paper of quality

meriting Latin honors. The proposed program of research must be approved in advance by the faculty sponsor and the director of the Honors Program. See the section on honors in this bulletin.

Education Program (EDU)

Assistant Professor of the Practice Malone, *Acting Associate Director and Director of Undergraduate Studies*; Professor Page; Associate Professors Di Bona and Sawyer; Professors of the Practice Ballantyne, Beckum, and Carbone; Assistant Professor of the Practice Bookman; Adjunct Professors Friedrich and Phillips; Adjunct Associate Professor Martin; Adjunct Assistant Professors Bryant and Wilson; Adjunct Assistant Professors of the Practice Lattimore and Teasley; Lecturer Riggsbee; Adjunct Lecturer Smith

Students who desire an understanding of the field of education as part of their liberal arts program should elect courses in accordance with their special interests. Selected courses in education may satisfy requirements in the social sciences area of knowledge. Students interested in licensure to teach secondary school should consult Professor Malone, director of teacher preparation. Students interested in licensure to teach elementary school should consult the elementary program coordinator, Ms. Riggsbee.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

100. Social and Philosophical Foundations of Education. (SS) Basic features and assumptions, viewpoints, and issues of education in contemporary America. One course. *Carbone or Di Bona*

108S. Teaching Practices in Elementary Language Arts and Content Areas. (SS) Research, theories, and practices of language arts, social studies, science, and mathematics instruction in the elementary school. Introduction to appropriate strategies and methodologies that reflect proven educational practices and research. A planned, sequential field-based experience in a model public school is provided. One course. *Riggsbee*

109S. Elementary Curriculum. Seminar in curriculum development. Principles, practices, and problems of instruction. For student teachers only. One course. *Bryant*

117S. Psychology of Personal and Social Adjustment. (SS) Principles of mental health affecting individual and social adjustments. One course. *Malone*

118. Educational Psychology. (SS) Emotional and cognitive learning in children, youth, and adults. One course. *Malone*

120. Elementary Education: Internship. Supervised internship in a teaching center in an elementary school, involving full-time teaching. For student teachers only. Pass/fail grading only. Two courses. *Riggsbee*

121. Infancy, Early Childhood, and Educational Programs. (SS) Developmental theories and their practical application in education. Emphasis on parenting and teaching. One course. *Riggsbee*

139. Marxism and Society. (SS) Core course for the Program in Perspectives on Marxism and Society. See C-L: Cultural Anthropology 139; also C-L: Comparative Area Studies, History 186, Interdisciplinary Course 139, Literature 139, and Sociology 139. One course. *Staff*

140. The Psychology of Work. (SS) Factors affecting career choice and change. One course. *Ballantyne*

143. Education, Culture, and Society. (SS) See C-L: Cultural Anthropology 143. One course. *Luttrell*

149S. Exceptional Children. (SS) Etiology and assessment of major types of exceptionalities, including intellectual abilities, physical or emotional handicaps, and sensorially impaired. Family relationships and treatment programs. One course. *Staff*

155S. Tests and Measurements. (SS) Measuring abilities, achievement, and personality. Analysis, criticism, and construction of tests for admission, classroom, and society. One course. *Page*

160. Early Childhood Internship. Internship in early childhood education centers, involving supervised experience. For Early Childhood Studies Certificate students only. One course. *Staff*

170, A-O. Selected Topics. One course. *Staff*

189S. The Teaching of Composition, Grammar, and Literature in Secondary School. Includes field-based experiences with local schools. See C-L: English 118S; also C-L: Linguistics. One course. *Teasley*

191, 192. Independent Study. Directed reading and research for juniors. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

For Seniors and Graduates

205, 206. Selected Topics. One course each. *Staff*

209. Global Education. (SS) A comparative survey of major educational changes and reforms in selected countries designed to illustrate general similarities and differences in the policies of developing and industrialized societies. Emphasis on American educational issues in the context of the emerging global economy. One course. *Di Bona*

210S. Higher Education in Latin America. (SS) An interdisciplinary and comparative approach to the issues and problems of higher education in the context of contemporary society. One course. *Di Bona*

215S. Seminar in Secondary School Teaching. Principles, practices, and problems in secondary school instruction. One course. *Carbone or staff*

216. Secondary Education: Internship. Supervised internship in a teaching center in a senior high school involving some full-time teaching. For student teachers only. Two courses. *Bookman, Smith, Teasley, Wilson, or staff*

225. Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. Includes field-based experiences with local schools. One course. *Wilson*

232. Learning and Living in Families. Role and function of the family as related to the development and behavior of its members, to gender identification, to parenting, and to interactions among family members. One course. *Ballantyne*

236S. Teaching Developmental and Remedial Reading in the Secondary School. Principles and methods for the development of effective reading and learning strategies in the high school classroom. Includes field-based experiences with local schools. One course. *Malone*

242S. Group Interactions. Examination of theoretical issues and processes involved in the dynamics of, and learning in, small groups of children, adolescents, parents, other adults, with attention to problem-oriented groups. One course. *Ballantyne*

246. Teaching of Mathematics. Aims, curriculum, and classroom procedure for teaching secondary school mathematics. Includes field-based experiences with local schools. One course. *Bookman*

276. Teaching of High School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedures, field trips, and course and lesson planning for secondary school science. Includes field-based experiences with local schools. One course. *Smith*

COURSES CURRENTLY UNSCHEDULED

103S. American Educational Theory. (SS)

168S. Contemporary Education Criticism. (SS)

171T, 172T. Junior-Senior Tutorials

173, 174. Clinical Reading Practicum

211. Education and the Mass Media. (SS)

212S. Pedagogy and Political Economy: A World View. (SS)

227. Contemporary Theories of Counseling and Psychotherapy. (SS)

248. Practicum in Counseling

UNIVERSITY PROGRAM FOR PREPARATION FOR TEACHING*

Duke University offers programs to prepare students to become licensed teachers in elementary and secondary schools. As students complete requirements of Trinity College and of a selected major they may also fulfill requirements of the approved teacher preparation program and become licensed to teach. Licensure by the Duke approved program is authorized through the State Board of Education in North Carolina and is reciprocal with most states. A license to teach along with an undergraduate degree is required by most public school systems and is recommended by many independent schools.

Brief descriptions of two undergraduate programs based on Bachelor of Arts or Bachelor of Science degrees (secondary school teaching and elementary teaching) are followed by a description of a program for secondary teaching based on a Master of Arts in Teaching degree. The goals of and criteria for admission to any of these programs are available from the respective offices.

Secondary School Teaching (A.B. or B.S. degree)

Students who are majors in the departments of English or mathematics may become eligible to be licensed to teach in their fields. Majors in biology, chemistry, environmental studies, geology, or physics may become eligible to be licensed to teach high school science. Majors in cultural anthropology, economics, history, political science, psychology, public policy, religion, or sociology are eligible to be licensed to teach social studies.

*Duke University is accredited by the North Carolina Department of Public Instruction and the National Council for Accreditation of Teacher Education (NCATE), and has reciprocal approval for initial licensure with most of the fifty states.

Prospective teachers are advised to consult with their major academic advisors and the director of teacher preparation concerning their interest in teaching and in being accepted into the preparation program.

Interested undergraduate students may apply to the secondary school teaching program in the spring of their sophomore year or the fall of their junior year. Students are accepted by competitive criteria into a program which includes education courses with field experiences in schools, and an intensive senior spring semester internship. During the internship students teach high school classes in their respective disciplines under the supervision of an experienced teacher and a university professor.

Upon completion of the senior year spring internship semester, and upon completion of the four-year Trinity College undergraduate degree, students may apply for licensure.

Elementary Teaching (A.B. or B.S. degree)

Undergraduate students who plan to teach young children (usually kindergarten through grade six) may qualify for licensure to teach while at Duke in addition to completing any academic major offered by Trinity College. The Elementary Program includes academic course work and an intensive senior fall semester internship.

Interested undergraduate students should apply to the elementary program in the fall of the junior year. Students are selected by competitive criteria for participation in the program. An intensive senior fall semester links together a teaching internship in a local public school, seminars, and independent directed research (four course credits). Students selected for the elementary teaching program are placed as interns with teachers in an elementary school and are also supervised by a Duke professor. Duke student interns begin their internship during preservice days before Duke classes begin.

Upon completion of the senior year fall semester internship and the four-year Trinity College undergraduate degree, students may apply for elementary teaching licensure.

Master of Arts in Teaching (MAT) in Secondary Schools

The Master of Arts in Teaching Program is designed for students who wish to teach their discipline in secondary schools by completing a graduate degree. Entry into the MAT Program is targeted for the second semester of the student's senior year. The normal sequence for MAT course work may begin in the spring semester of the senior year. Courses may not be double-counted toward both the bachelor's and MAT degrees. Additional information is available from the Office of the Dean of the Graduate School. This program is approved for teacher certification by the State Board of Education in North Carolina and is reciprocal with most states.

EARLY CHILDHOOD EDUCATION STUDIES CERTIFICATE PROGRAM

The goal of this program, which offers an interdisciplinary certificate in Early Childhood Education Studies, is to serve students who, in addition to their majors, may develop a concentration in early childhood development by selecting studies in psychology, sociology, cultural anthropology, and education in a supervised internship experience with child care centers, preschools, and families. The certificate curriculum requires six courses: two specifically designated as required and four elective. A required core course provides a comprehensive view of early childhood education, its history, programs, and current issues in the field. Other courses provide an additional academic base in understanding the development of the child and conditions of childhood. The internship provides direct experience under supervision in an approved child care center combined with weekly group discussions with a Duke internship supervisor. A paper developed on a topic relevant to the internship experience is required of internship participants. The certificate in Early Childhood Education Studies may help qualify a student to provide leadership in child care centers, to raise standards in commu-

nities for improved early childhood programs, or identify an area for postbaccalaureate study.

The capstone course, Education 160 (Internship), is available only to students seeking the program certificate. Other components of the program are open to undergraduates. For additional information contact the Program in Education.

Introductory course

Education 121. *Infancy, Early Childhood, and Educational Programs. Riggsbee*

Four courses, at least two in each area:

Development of the Child:

Psychology 97. *Developmental Psychology: Introduction and Survey. Goldstein, Mazuka, Needham, Putallaz, or staff*

Psychology 121. *Early Cognitive Development. Needham*

Psychology 124. *Human Development. N. Anderson and staff*

Psychology 131. *Early Social Development. Putallaz*

Psychology 142S. *Child Observation. Musia Lakin*

Psychology 159S. *Biological Psychology of Human Development. Thompson*

or

Psychology 136. *Developmental Psychobiology. Eckerman*

Psychology 205S. *Children's Peer Relations. Putallaz*

or

Psychology 206S. *Pediatric Psychology. Thompson*

Psychology 214S. *Development of Social Interaction. Eckerman*

Education 118. *Educational Psychology. Malone*

Education 149S. *Exceptional Children. Staff*

Conditions of Childhood: (See "Development of the Child")

Cultural Anthropology 112. *Current Topics in Linguistics. Staff*

Cultural Anthropology 143. *Education, Culture, and Society. Luttrell*

Cultural Anthropology 280S. *Selected Topics: Advertising and Childhood. O'Barr*

Education 232. *Learning and Living in Families. Ballantyne*

Sociology 111. *Social Inequality: An International Perspective. DiPrete or O'Rand*

Sociology 117. *Childhood in Social Perspective. Simpson*

Sociology 118. *Sex, Gender, and Society. O'Rand*

Sociology 123. *Social Aspects of Mental Illness. George or Jackson*

Sociology 150. *The Changing American Family. Simpson*

Sociology 169. *Psychosocial Aspects of Human Development. Staff*

Sociology 215. *Basic Demographic Methods and Materials. Myers or Parnell*

Supervised Internship:

Education 160. *Early Childhood Internship. Staff*

English (ENG)

Professor Jackson, *Chair*; Professor Butters, *Associate Chair*; Associate Professor Gerber, *Director of Undergraduate Studies*; Professor of the Practice Gopen, *Supervisor of Freshman Instruction and Director of University Writing Program*; Professors Aers, Applewhite, Clum, C. Davidson, DeNeef, Fish, Gleckner, Holloway, Lentricchia, Price, Randall, Ryals, Sedgwick, B. H. Smith, Strandberg, Tompkins, Torgovnick, and K. Williams; Associate Professors Gaines, Jones, Mellow, Moon, Moses, Pope, Porter, Schwartz, and Willis; Assistant Professors Clarke, Ferraro, Pfau, Tetel, and Thorn; Assistant Professors of the Practice Cox, Hillard, and Malouf; Adjunct Professor A. Davidson; Adjunct Associate Professors Hill and Ruderman; Adjunct Assistant Professors Kennedy, Sasson, and Wittig; Visiting Assistant Professors Rosenfeld and Valbuena; Lecturer Chandler; Visiting Instructor Woodruff

A major is available in this department.

WRITING AND LANGUAGE

For courses in composition see below and also University Writing Courses 3, 4, 5, 6, 7, 8, and 12 in the University Writing Program section of this bulletin.

27S. Studies in Nonliterary Topics. May be taken twice. One course. *Staff*

29. Composition and Language. Credit for advanced placement on the basis of the College Board examination in composition and language. One course.

63S. Introduction to Creative Writing. (AL) One course. *Staff*

100A, S. Writing: Fiction. (AL) Instruction in the writing and study of fiction. Recommended for students before they take English 103S, 104S, 110S, 202S, or 203S. Consent of instructor required. One course. *Staff*

100B, S. Writing: Drama. (AL) Instruction in the writing and study of drama. Recommended for students before they take English 102S or 107S. Consent of instructor required. One course. *Staff*

100C, S. Writing: Poetry. (AL) Instruction in the writing and study of poetry. Recommended for students before they take English 105S or 106S. Consent of instructor required. One course. *Staff*

103S, 104S. Writing: Short Stories. (AL) Class discussion of students' manuscripts, individual conferences with the instructor. Open to sophomores, juniors, and seniors; recommended for, but not limited to, students who have taken English 100A. Consent of instructor required. One course each. *Applewhite, Cox, Malouf, Pope, Porter, or Price*

105S, 106S. The Writing of Poetry. (AL) Meter, image, tone, and dramatic organization in traditional and modern poems as a basis for original composition. Open to sophomores, juniors, and seniors; recommended for, but not limited to, students who have taken English 100C. Consent of instructor required. One course each. *Applewhite or Pope*

107S. Playwriting I. (AL) Fundamentals of writing for stage and screen. Open to sophomores, juniors, and seniors; recommended for, but not limited to, students who have taken English 100B. Prerequisites: a practical theater course (for example, acting, directing, design, stagecraft) and consent of instructor. C-L: Drama 111S and Film and Video. One course. *Staff*

108S. Playwriting II. (AL) Advanced projects in writing for production. Prerequisites: Drama 111S or English 107S; Drama 99S, 101S, or 181S; and consent of instructor. C-L: Drama 112S and Film and Video. One course. *Staff*

109S. Special Topics in Writing. (AL) Consent of instructor required. One course. *Staff*

110S. Writing: Longer Prose Narrative. (AL) The writing of a novel, novella, or group of short stories. Primarily for juniors and seniors. Consent of instructor required. One course. *Cox, Porter, or Price*

111. Introduction to Linguistics. (SS) See C-L: Cultural Anthropology 107; also C-L: Interdisciplinary Course 111 and Linguistics. One course. *Butters or Tetel*

112. English Historical Linguistics. (SS) Introduction to methods and principles of historical linguistics, as exemplified by the history of the English language from Proto-Indo-European to the present. Not open to students who have taken English 208. C-L: Linguistics. One course. *Butters or Tetel*

116A. Scientific Writing. Prerequisite: University Writing Course 4, 5, 6, or 7. See C-L: University Writing Course 112. One course. *Staff*

117A, S. Advanced Composition I. See C-L: University Writing Course 117S. One course. *Staff*

117B, S. Advanced Composition II. Prerequisite: successful completion of English 117A. See C-L: University Writing Course 118S. One course. *Staff*

118S. The Teaching of Composition, Grammar, and Literature in Secondary School. Visits to secondary school English classes, discussion with successful teachers, practice in making presentations, and evaluation of written work and other performance. C-L: Education 189S and Linguistics. One course. *Tasley*

119. Current Topics in Linguistics. (SS) May be repeated as topics vary. See C-L: Cultural Anthropology 112; also C-L: Interdisciplinary Course 119 and Linguistics. One course. *Staff*

For Juniors, Seniors, and Graduates

202S. Narrative Writing. (AL) The writing of short stories, memoirs, tales, and other narrations. Readings from ancient and modern narrative. Close discussion of frequent submissions by class members. Consent of instructor required. One course. *Porter or Price*

203S. Advanced Narrative Writing. (AL) The writing of extended narrative prose—long stories, novellas, substantive memoirs. Students should be proficient in the writing of short narratives. Consent of instructor required. One course. *Porter or Price*

205. Semiotics and Linguistics. (SS) See C-L: Russian 205; also C-L: Linguistics. One course. *Andrews*

208. History of the English Language. (SS) Introductory survey of the changes in sounds, forms, and vocabulary of the English language from its beginning to the present, with emphasis on the evolution of the language as a medium of literary expression. Not open to students who have taken English 112. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Butters or Tetel*

290. Methods of Composition Pedagogy. (SS) A philosophical and practical exploration of developments in the field of composition studies. Cognition, concept formation, psycholinguistics, interpretation, and the making of meaning. Works by Burke, Richards, Kitzhaber, Berlin, Berthoff, Bizzell, Elbow, Corbett, Macrorie, Williams, Coles, and others. One course. *Gopen or Hillard*

INTRODUCTION TO LITERATURE

20. Literature and Composition. Credit for advanced placement on the basis of the College Board examination in literature and composition. One course.

21S. Studies in the Novel. (AL) One course. *Staff*

22S. Studies in Drama. (AL) One course. *Staff*

23S. Studies in the Short Story. (AL) One course. *Staff*

24S. Studies in Poetry. (AL) One course. *Staff*

25S. Studies in the Epic. (AL) One course. *Staff*

26S. Studies in Special Topics. (AL) May be taken twice. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50S. American Literature Walkabout. An experimental course designed to engage students with literature at the deepest level. The main texts will be *Moby Dick*, *Beloved*,

The Awakening, readings from Thoreau, "Song of Myself," and other poems. Approaches will be largely student generated and may include field trips, graphic representation, autobiography, and drama. Emphasis on group interaction, self-discovery, experiential learning. Weekly writing assignments. Pass/fail grading only. One course. *Tompkins*

51, 52. Representative American Writers. (AL) Selections and complete works. 51: Poe, Emerson or Thoreau, Hawthorne, Melville, Whitman, Dickinson, and Twain; not open to students who have taken English 152 or 153. 52: James, Frost or Robinson, Crane or Dreiser, O'Neill, Faulkner, Hemingway, and others. Not open to students who have taken English 153 or 154. One course each. *Staff*

90. Reading Critically: Poetry, Fiction, Drama. (AL) An introduction to the skills of critical reading and the vocabulary of critical analysis by close examination of poetry, fiction, and drama from a range of historical periods. A handbook or comparable guide to critical terms will be assigned. One course. *Staff*

90S. Reading Critically: Poetry, Fiction, Drama. (AL) A seminar version of English 90. One course. *Staff*

91. Reading Critically: Chaucer, Shakespeare, Milton, Pope. (AL) An introduction to the skills of critical reading and the vocabulary of critical analysis by close examination of the works of Chaucer, Shakespeare (or occasionally Spenser), Milton, and Pope. Focus on the acquisition of critical skills through analyzing the works of authors closely linked with the making of the dominant traditions of English poetry. A handbook or comparable guide to critical terms will be assigned. One course. *Staff*

92. British Literature 1750-1950. (AL) Studies in the literature of Great Britain from the eighteenth century through the modern period. One course. *Staff*

94. Introduction to Theater. (AL) See C-L: Drama 51. One course. *Clum or Riddell*

ENGLISH AND BRITISH LITERATURE

121. Medieval English Literature to 1500. (AL) The principal forms and examples of English prose, poetry, and drama of the Anglo-Saxon and Middle English periods (excluding Chaucer). In translation. C-L: Medieval and Renaissance Studies. One course. *Aers*

122. Sixteenth-Century English Literature. (AL) Emphasis in poetry on Wyatt, Sidney, Spenser, Raleigh, and Shakespeare; in prose on Sidney and Sir Thomas More; in drama on Marlowe. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, Randall, or Schwartz*

123. English Literature: 1600 to 1660. (AL) Emphasis in poetry on Jonson and the cavaliers, Donne and the metaphysicals; in drama on Jonson, Tourneur, Webster, and Ford; in prose on character writers, Bacon, Burton, Donne, and Browne. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, Randall, or Schwartz*

124. English Literature: 1660 to 1800. (AL) Major genres and authors such as Dryden, Congreve, Addison, Swift, Pope, Gray, Johnson, Blake, and Defoe or Fielding. One course. *Jackson or Thorn*

125. English Literature of the Romantic Period. (AL) Wordsworth, Coleridge, Byron, Shelley, Keats. One course. *Applewhite, Gleckner, Jackson, or Pfau*

126. English Literature: 1832 to 1900. (AL) Major writers and genres, with special emphasis on the Brontës, Dickens, Hardy, Tennyson, Carlyle, Browning, Arnold, and Ruskin. One course. *Ryals or Sedgwick*

127. British Literature: 1900 to 1945. (AL) Principal writers of fiction, drama, and poetry such as Yeats, Conrad, Shaw, Joyce, Lawrence, Woolf, Eliot, Auden, and others. One course. *Mellown, Moses, or Pope*

128. Special Topics in British Literature since 1945. (AL) One course. *Staff*

130. Shakespeare and the Theater. (AL) See C-L: Drama 154. One course. *Clum or Randall*

131. Studies in a Single British Author. (AL) One course. *Staff*

132A. Faith and Fiction in Victorian England. (AL) (Summer program in England.) Not open to students who have taken English 137. See C-L: Religion 186. One course. *Staff*

132B. Atmosphere and Mystery in Twentieth-Century English Fiction. (AL) Not open to students who have taken English 138. See C-L: Religion 187. One course. *Kort*

132E, S. Nineteenth-Century British Literature. (AL) (Taught in the Oxford summer program.) Two courses. *Staff*

132G, S. Twentieth-Century British Literature. (AL) (Taught in the Oxford summer program.) Two courses. *Staff*

133. Modern British Drama. (AL) O'Casey, Coward, Eliot, Osborne, Pinter, Beckett, Stoppard, and others. C-L: Drama 121. One course. *Clum or Moses*

134S. Drama in Performance. (AL) Drama from the Elizabethan period to the present based on performances offered by the Royal Shakespeare Company, Royal National Theatre, and other theaters in London. Twenty plays will be seen and studied. (London summer program.) C-L: Drama 149S. One course. *Clum*

135. British Poetry of the Twentieth Century. (AL) Changes in poetry and its criticism from the Edwardians. Yeats, Housman, Lawrence, Owen, the Sitwells, Graves, Auden, MacNeice, Dylan Thomas, Hughes, and Larkin. One course. *Mellown, Moses, or Pope*

136. Eighteenth-Century British Novel. (AL) Defoe, Richardson, Fielding, Smollett, and Sterne; the Gothic novel. One course. *Jackson or Thorn*

137. Nineteenth-Century British Novel. (AL) Scott, Austen, Dickens, Thackeray, Trollope, the Brontës, George Eliot, Meredith, Butler, Hardy, and others. Not open to students who have taken English 132A. One course. *A. Davidson, Moses, Ryals, or Sedgwick*

138. Twentieth-Century British Novel. (AL) Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. Not open to students who have taken English 132B. One course. *A. Davidson, Mellown, Moses, or Pope*

139S. Special Topics in British Literature. (AL) One course. *Staff*

Major Authors

140, 141. Chaucer. (AL) 140: first two-thirds of his career, especially *Troilus and Criseyde*. 141: *The Canterbury Tales*. C-L: Medieval and Renaissance Studies. One course each. *Aers, DeNeef, or Gopen*

143, 144. Shakespeare. (AL) 143: twelve plays before 1600. 144: usually ten plays after 1600. C-L: Drama 115, 116 and Medieval and Renaissance Studies. One course each. *DeNeef, Gopen, Jones, Porter, Randall, or Valbuena*

145. Milton. (AL) Poetry and its literary and social background. C-L: Medieval and Renaissance Studies. One course. *Fish, Price, or Schwartz*

For Juniors, Seniors, and Graduates

212. Middle English Literature: 1100 to 1500. (AL) Selected topics. C-L: Medieval and Renaissance Studies. One course. *Aers*

213, 214. Chaucer. (AL) 213: first two-thirds of his career, especially *Troilus and Criseyde*. 214: *The Canterbury Tales*. C-L: Medieval and Renaissance Studies. One course each. *Aers*

220. Shakespeare: Selected Topics. (AL) One course. *Staff*

221. Renaissance Prose and Poetry: 1500 to 1660. (AL) Selected topics. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, Randall, or Schwartz*

222. Reading Milton. (AL) Milton's epic as a way of exploring some of the questions that have recently been asked about the humanities in general and literary studies in particular. Is the reconstruction of a perspective within which older texts can be responsibly read possible? What do you have to "know" in order to read *Paradise Lost*? What do you have to know in order to know what you have to know to read *Paradise Lost*? Obviously, *Paradise Lost* will be the center of the course, but we shall also read others of Milton's works and look into the tight little world of Milton criticism. C-L: Distinguished Professor Course 222. One course. *Fish*

225. Renaissance Drama: 1500 to 1642. (AL) Selected topics. C-L: Drama 225 and Medieval and Renaissance Studies. One course. *Randall*

235. Restoration and Eighteenth-Century Literature: 1660 to 1800. (AL) Selected topics. One course. *Jackson or Thorn*

241. Romantic Literature: 1790 to 1830. (AL) Selected topics. One course. *Applewhite, Gleckner, Jackson, or Pfau*

245. Victorian Literature: 1830 to 1900. (AL) Selected topics. One course. *Ryals or Sedgwick*

251. British Literature since 1900. (AL) Selected topics. One course. *Lentricchia, Mellow, Moses, or Torgovnick*

AMERICAN LITERATURE

152. American Literature: 1820 to 1860. (AL) Prose and poetry of American romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. Not open to students who have taken English 51. One course. *C. Davidson, Gerber, Jones, Moon, Tompkins, or K. Williams*

153. American Literature: 1860 to 1915. (AL) Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. Not open to students who have taken English 52. One course. *C. Davidson, Jones, Moon, or K. Williams*

154. American Literature: 1915 to 1960. (AL) Eliot, Fitzgerald, Hemingway, Faulkner, and others. Not open to students who have taken English 52. One course. *Clum, Ferraro, Lentricchia, Moon, Moses, Pope, or Strandberg*

155. Contemporary American Writers. (AL) Novelists and poets prominent since 1960. One course. *Clum, C. Davidson, Ferraro, Moses, or Strandberg*

159. Modern Southern Writers. (AL) Writers who came to maturity following World War I, and their successors: Faulkner, Wolfe, Porter, Tate, Warren, Welty, Taylor, Percy,

O'Connor, Dickey, Hurston, Walker, and others. Works analyzed in the historical and cultural context of the region. One course. *Applewhite*

161. Studies in a Single American Author. (AL) One course. *Staff*

162. Twentieth-Century American Drama. (AL) Representative plays by O'Neill, Odets, Williams, Miller, Albee, Lanford Wilson, and others. C-L: Drama 120. One course. *Clum*

163. Twentieth-Century American Poetry. (AL) The classicism of Pound, Eliot, and the Fugitives in relation to the neoromanticism of Stevens, Williams, Crane, and Roethke. Developments during World War II and after: Lowell, Jarrell, Berryman, Dickey, Levertov, and Wright. One course. *Applewhite, Moon, Moses, or Pope*

167, 168. African American Literature. (AL) 167: oral and literary traditions from the American colonial period into the nineteenth century, including the spiritual as lyric poetry and the slave narrative as autobiography. 168: the late nineteenth and early twentieth century to contemporary writers. C-L: African and Afro-American Studies 173, 174. One course each. *Chandler, Clarke, or Holloway*

169S. Special Topics in American Literature. (AL) One course. *Staff*

For Juniors, Seniors, and Graduates

263. American Literature to 1865. (AL) Selected topics. One course. *C. Davidson, Jones, Moon, or Tompkins*

267. American Literature: 1865 to 1915. (AL) Selected topics. One course. *C. Davidson, Tompkins, or K. Williams*

269. American Women Writers. (AL) Selected topics. C-L: Women's Studies. One course. *C. Davidson, Pope, or Tompkins*

275. American Literature since 1915. (AL) Selected topics. One course. *Ferraro, Lentricchia, Pope, or Strandberg*

GENRE, CRITICISM, AND WORLD LITERATURE

170. Studies in Genre. (AL) One course. *Staff*

172. Literary Theory. (AL) Major works and theoretical issues in the history of literary criticism. One course. *Staff*

174A. Drama and Theater from 1590 to 1700. (AL) See C-L: Drama 151; also C-L: Literature 173. One course. *Blackadder, Clum, or Randall*

174B. World Theater: Realism and Modernisms. (AL) See C-L: Drama 152; also C-L: Literature 174. One course. *Blackadder, Clum, or Riddell*

175. Literary Approaches to the Bible. (AL) Selected books of both Testaments, emphasizing narrative strategies, literary contexts, and Biblical genres: primeval myth, patriarchal history, prophecy, and apocalyptic. One course. *Schwartz*

176S. Text and Performance. (AL) The stages of realization of a play or musical from the script to the production, focusing on productions in London. Aspects of theatrical performance and production through backstage tours, scene work, discussions and workshops with theater practitioners, observations of theater at work, and supervised projects. (London summer program.) C-L: Drama 148S. One course. *Clum*

177. Third World and Postcolonial Fiction. (AL) Comparative study of representative contemporary fiction from Africa, India, the Middle East, Australia, New Zealand,

Latin America, and the Caribbean, each within its appropriate cultural, historical, and political context. All readings in English. One course. *Moses*

178. Literature and the Other Arts. (AL) Selected topics in the study of the interrelation of literature and other art forms, such as music and painting. One course. *Staff*

179S. Special Topics in a Literary Genre. (AL) One course. *Staff*

180. Writings in the Rural Tradition: From the Caribbean to the American South. (AL) See C-L: Literature 180; also C-L: African and Afro-American Studies 180 and Comparative Area Studies. One course. *Willis*

184. Literature and Sexualities. (AL) American and British representations of sexual identities and same-sex desire, ranging from the proliferation of homo-/heterosexual discourses in the late nineteenth century to literature about AIDS in contemporary mass media. Whitman, Wilde, Stein, Hall, Forster, Lorde, Moraga, Watney, and others. One course. *Clum or Moon*

186A. S. Canadian Literature in English. (AL) Eighteenth century to the present. Emphasis on the twentieth century and on novels by Hugh MacLennan, Margaret Laurence, Mordecai Richler, Margaret Atwood, Rudy Wiebe, and others. C-L: Canadian Studies and Comparative Area Studies. One course. *A. Davidson*

186B. S. Canadian Theater. (AL) A survey of Canadian drama. C-L: Canadian Studies. One course. *Staff*

For Juniors, Seniors, and Graduates

281. Studies in Genre. (AL) History, criticism, and theory of literary genres such as the novel, pastoral, epic, and drama. One course. *Staff*

285. Major Texts in the History of Literary Criticism. (AL) A survey of major critical writings from Aristotle to the present. One course. *Staff*

288. Special Topics. (AL) Subjects, areas, or themes that cut across historical eras, several national literatures, or genres. One course. *Staff*

289. The Theory of the Novel. (AL) Major issues in the history and theory of the novel. One course. *Moses or Torgovnick*

CULTURAL STUDIES

101A. Introduction to Film. (AL) Basic film theory and history of motion picture technology. Introduction to experimental, documentary, and narrative forms of Third World, European, and United States cinemas. Economics and aesthetics. C-L: Drama 132 and Film and Video. One course. *Gaines*

101B. Introduction to Cultural Studies. (AL) Basic theoretical approaches to high and low culture—Bourdieu and Adorno, the Frankfurt School and the Birmingham Center for Contemporary Cultural Studies; Third World and feminist approaches; the avant-garde and subcultural resistance. Analysis of sport and leisure, film and photography, law and the arts, popular and classical music, painting and advertising imagery. C-L: Film and Video and Literature 102. One course. *Gaines, Radway, Surin, Tompkins, or Willis*

101D. D. Perspectives in Gay, Lesbian, and Bisexual Studies. (CZ) See C-L: Interdisciplinary Course 115D. One course. *Staff*

120. Advertising and Society: Global Perspective. (SS) See C-L: Cultural Anthropology 110; also C-L: Film and Video, Sociology 160, and Women's Studies. One course. *Luttrell, O'Barr, J. Smith, or Wilson*

156. History of Mass Culture in the United States. (AL) The formation of American popular culture in different historical periods. Cultural forms including music, movies, fashion, and leisure. C-L: Literature 156. One course. *Gaines, Radway, Tompkins, or Willis*

157, 158. American Literature and Culture. (AL) Relationship of literature to the other arts, American intellectual history, religion, science, technology, and architecture. 157: to the Civil War. 158: from the Civil War to 1960. One course each. *K. Williams*

181. Psychoanalysis, Literature, and Film. (AL) See C-L: Literature 185; also C-L: Comparative Area Studies, Film and Video, and Women's Studies. One course. *Gaines*

183S. Film and Video Theory and Practice. (AL) Film and video production in conjunction with comparative history and theory of these technologies. Students produce works in basic Super 8 mm, 16 mm, and small format video production. Prerequisite: Drama 132, English 101A, or Literature 177. C-L: Drama 131S and Film and Video. One course. *Staff*

185. Studies in Film History. (AL) Close examination of a particular issue, period, national cinema, or technological development. C-L: Drama 136, Film and Video, and Literature 187. One course. *Clum, Gaines, or Jameson*

187. Melodrama and Soap Opera. (AL) History of melodrama from Victorian theatrical production to television soap opera. Close study of popular women's fiction, silent cinema, the thirties and forties woman's picture, and fifties technicolor melodrama. C-L: Drama 137, Film and Video, and Women's Studies. One course. *Clum or Gaines*

189S. Special Topics in Film. (AL) A major genre, period, or director. Prerequisite: Drama 132 or English 101A. C-L: Drama 197S and Film and Video. One course. *Clum or Gaines*

For Juniors, Seniors, and Graduates

284. Contemporary Film Theory. (AL) Post-1968 film theory—Brechtian aesthetics, cinema semiotics, psychoanalytic film theory, technology, feminist theory, and Third World cinema. One course. *Gaines*

INDEPENDENT STUDY

191, 192, 193, 194. Independent Study. Directed reading and research. Consent of both the instructor and the director of undergraduate studies required. Half or one course each. Variable credit. *Staff*

195T. Tutorial. Directed reading and research. Students should consult the director of undergraduate studies as early as possible in the preceding term. One course. *Staff*

DISTINCTION SEMINARS

197A, 198A, S. Distinction Program Sequence. Open to those whose thesis will be a critical paper or piece of other research (for example, in linguistics). Consent of instructor required. One course each. *Staff*

197B, 198B, S. Distinction Program Sequence. Open to those whose thesis will be in the field of creative writing. Consent of instructor required. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

102S. Screenwriting. (AL)

113A. Introduction to Old English. (AL)

113B. Old English Literature. (AL)

- 115. Present-Day English. (SS)
- 151. American Literature to 1820. (AL)
- 164, 165. American Fiction. (AL)
- 173. Legend and Literature. (AL)
- 182. American Film Genres. (AL)
- 188. Narrative Film and the Novel. (AL)
- 190. Television, Technology, and Culture. (AL)
- 207A. Introduction to Old English. (AL)
- 207B. Old English Literature. (AL)
- 209. Present-Day English. (SS)

THE MAJOR

For students matriculating in the fall 1992 semester and thereafter:

Basic Requirement. One course from the following list of introductory courses: English 90, 90S, or 91. Except by written permission of the director of undergraduate studies, the course must be taken in the first term after the major has been declared (unless it has been taken earlier). It may be taken concurrently with advanced courses.

Major Requirements. Eight or more courses at the 100- or 200-level, which are to be organized into a coherent plan of study approved by the student's advisor. The courses must include: (a) one of the following major author courses—Chaucer (140, 141, 213, 214), Shakespeare (143, 144, 220), or Milton (145, 222); (b) two courses in British literature before 1900 (including at least one before 1800 in addition to the course taken to satisfy the major author requirement); (c) one 100-level seminar.

Recommended, but not required: students planning to enter graduate study in English or American literature should plan to take at least two additional 100-level (or 200-level) courses in British literature before 1900, including at least one more before 1800.

For students who matriculated before the fall 1992 semester:

Students may satisfy the requirements listed above for those matriculating in the fall 1992 semester and thereafter or they may satisfy the requirements as published in the bulletin for the year that they matriculated.

Foreign Languages

The department recommends that students majoring in English complete at least two years of college-level study, or the equivalent, of a foreign language. Students contemplating graduate work in English should note that many master's programs require examination in one foreign language and that doctoral programs commonly require examination in two. Students interested in linguistics are strongly urged to study at least one non-Indo-European language.

Teacher Certification

Each year a number of Duke English majors earn licensures as secondary school teachers. While licensed by the state of North Carolina, such majors are essentially licensed for other states as well. Such training is urged also for those who consider private-school teaching since most private or parochial schools, other things being equal, would prefer the experienced and trained candidate. Such licensing may be gained as

part of the English major and is not as time consuming as sometimes believed. Candidates should have a solid background in both American and British literature. Also helpful are courses in composition and cultural studies. Among the requirements are one course in linguistics (English 111, 112, 115, 119, 205, 208, or 209), an appropriate course in psychology, and several courses in education.

The last semester of the senior year is devoted to the student-teaching block, including two special, accelerated courses and ten weeks of full-time teaching and observation in the schools, working with a mentor-teacher and with Duke faculty. This experience leads to an English-teaching certificate to accompany the bachelor's degree.

Anyone considering secondary school English teaching should confer with Professor Malone in the Program in Education as soon as possible.

Distinction/Honors

The graduation with distinction program is designed for the department's best and most serious students who are willing to make a sustained commitment to the distinction project. The program consists of two seminars—English 197A,S and 198A,S or 197B,S and 198B,S—taken in the fall and spring semesters of the senior year.

English 197S varies in content and format according to the interests of the instructor and students. It also provides a forum in which to discuss the selection and focusing of thesis topics, preliminary research and organization, and the writing of part of the thesis. English 198S will involve substantial independent work towards completing the distinction thesis, with some seminar meetings and regular conferences with the instructor. The distinction thesis can be a critical paper or an equivalent piece of other research (for example, in linguistics) or creative writing. The department's distinction/honors committee will evaluate the theses and award distinction. A student who has done satisfactory work in the seminars but whose thesis is denied distinction will receive graded credit for English 197A,S and 198A,S or 197B,S and 198B,S, but not distinction. Theses awarded distinction will be bound and deposited in Perkins Library. Students interested in distinction must apply to the department's committee by February 15 of the junior year. Applicants normally must have completed at least three courses in English (not including a University Writing Course) and must have a minimum 3.3 average in their English courses. In addition, they must submit a writing sample and solicit a written recommendation from one of their instructors (in courses other than the University Writing Course).

Students who successfully complete the distinction program as detailed above may be eligible as well for graduation with Latin honors. To be awarded Latin honors in this way at graduation, a student must have maintained a 3.5 grade point average in English and a 3.3 grade point average overall and written a distinction thesis of exceptional merit, as evaluated by the department's distinction/honors committee.

School of the Environment

The professional school courses listed below are described fully in the *Bulletin of Duke University: School of the Environment*. They are open to undergraduates by consent of the instructor; they do not count for area of knowledge distribution requirements.

Students who are preparing for professional careers in natural resources and the environment should refer to the section on undergraduate-professional combination programs and the section Environmental Sciences and Policy Program in this bulletin.

200. Integrated Case Studies. Prerequisite: consent of the dean of the School of the Environment. Credit to be arranged. *Staff*

201. Forest Resources Field Skills. Half course. *Davison and Richter*

204. Forest Inventory, Growth, and Yield. One course. *Davison*

205, 205L. Ecological Management of Forest Systems (Silviculture). One course. *Oren*

207, 207L. Forest Pest Management. One course. *Stambaugh*

- 211L. Applied Ecology and Ecosystem Management. Prerequisites: introductory course in biology and ecology. One course. *Richardson*
212. Environmental Toxicology. Prerequisites: organic chemistry and vertebrate physiology or consent of instructor. One course. *Di Giulio*
213. Forest Ecosystems. One course. *Richter*
215. Environmental Physiology. One course. *Di Giulio and Oren*
216. Applied Population Ecology. Prerequisites: introductory statistics, calculus, and computer programming, or consent of instructor. One course. *Maguire*
217. Tropical Ecology. Prerequisite: a course in general ecology. C-L: Biology 215. One course. *Terborgh*
- 218L. Barrier Island Ecology. (Given at Beaufort.) Prerequisite: introductory biology; suggested: course in botany or general ecology. C-L: Biology 218 and Marine Sciences. One and one-half courses. *Staff*
- 219L. Marine Ecology. (Given at Beaufort.) Prerequisites: none; suggested—introductory ecology, invertebrate zoology, or marine botany. C-L: Biology 203L and Marine Sciences. One and one-half courses (summer), one course (fall and spring). *Kirby-Smith or staff*
220. Vegetation Management in Urban Ecosystems. One course. *Stambaugh*
221. Soil Resources. One course. *Richter*
222. Physical Processes in Coastal Environments. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32. C-L: Geology 201 and Marine Sciences. One course. *Howd*
- 225L. Coastal Ecotoxicology and Pollution. (Given at Beaufort.) Prerequisites: introductory chemistry and biology. C-L: Marine Sciences. One course. *Kenney*
- 226L. Marine Mammals. (Given at Beaufort.) Prerequisite: introductory biology. C-L: Marine Sciences. One course. *Staff*
- 230L. Weather and Climate. One course. *Knoerr*
232. Microclimatology. C-L: Biology 232. One course. *Knoerr*
- 234L. Watershed Hydrology. One course. *Katul*
235. Air Quality Management. One course. *Vandenberg*
236. Water Quality Management. One course. *Reckhow*
240. Fate of Organic Chemicals in the Aquatic Environment. Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Civil and Environmental Engineering 240. One course. *Dubay and Faust*
241. Atmospheric Chemistry and Air Pollution. Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Civil Engineering 241. One course. *Faust*
242. Environmental Aquatic Chemistry. Prerequisite: university-level general chemistry within the last four years. C-L: Civil and Environmental Engineering 242. One course. *Faust*
243. Environmental Biochemistry. (Given at Beaufort.) Prerequisite: organic chemistry. C-L: Cell Biology 243 and Marine Sciences. One course. *C. Bonaventura and Brouwer*
- 244L. Cellular and Molecular Research Techniques. (Given at Beaufort.) Prerequisite: organic chemistry. C-L: Cell Biology 244L and Marine Sciences. One course. *C. Bonaventura and Brouwer*
245. Ecology of Microorganisms. One course. *Staff*
246. Survey of Occupational Health and Safety. Prerequisite: consent of instructor. One course. *Staff*
247. Survey of Environmental Health and Safety. Prerequisite: consent of instructor. One course. *Staff*
248. Solid Waste Engineering. Prerequisite: Civil Engineering 124L or consent of instructor. C-L: Civil Engineering 248. One course. *Vesilind*
251. Statistics and Data Analysis in Biological Science. C-L: Statistics 210B. One course. *Staff*
- 252L. Statistics and Data Analysis in Earth and Ocean Science. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32, Statistics 110 or 112, or consent of instructor. C-L: Geology 222L and Marine Sciences. One course. *Howd*
253. Environmental Applications of Biometry. Prerequisite: Environment 251 or equivalent. One course. *Gerhart*
255. Applied Regression Analysis. Prerequisite: Statistics 210B or equivalent. C-L: Statistics 242. One course. *Staff*
- 256S. Seminar in Ocean Sciences. (Given at Beaufort.) Prerequisite: consent of instructor. C-L: Marine Sciences. One-half course. *Staff*
261. Remote Sensing for Resource Management. One course. *Davison*
268. Advanced Topics in Nearshore Processes. Prerequisite: Mathematics 111 or 114, or Environment 290, or consent of instructor. C-L: Geology 204. One course. *Howd*
- 270L. Resource and Environmental Economics. Prerequisite: introductory course in microeconomics. C-L: Economics 270L and Public Policy Studies 272L. One course. *Kramer*
271. Economic Analysis of Resource and Environmental Policies. Prerequisite: Environment 270 or equivalent; Economics 149 is recommended. C-L: Economics 272. One course. *Staff*
272. Evaluation of Public Expenditures. C-L: Economics 261 and Public Policy Studies 261. One course. *Conrad*
273. Marine Fisheries Policy. (Given at Beaufort.) C-L: Marine Sciences. One course. *Orbach*

274. Resource and Environmental Policy. Prerequisite: Environment 270L, Public Policy Studies 272, or consent of instructor. C-L: Public Policy Studies 274. One course. *Staff*
276. Marine Policy. (Given at Beaufort.) Consent of instructor required. C-L: Marine Sciences and Public Policy Studies 197. One course. *Orbach*
277. Conservation and Sustainable Development I: Concepts and Methods. One course. *Staff*
278. Conservation and Sustainable Development II: Integrated Problem Solving. One course. *Staff*
- 282S. Environmental Ethics. Consent of instructor required. C-L: Philosophy 289S. One course.
- Cooper*
285. Land Use Principles and Policy. C-L: Public Policy Studies 285. One course. *Healy*
290. Physical Oceanography. Prerequisites: Mathematics 31 and 32 or consent of instructor. C-L: Geology 203 and Mechanical Engineering 290. One course. *Lozier*
291. Geological Oceanography. Not open to students who have taken Geology 206S. (Given at Beaufort.) C-L: Geology 205 and Marine Sciences. One course. *Staff*
- 297L. Biology of Marine Invertebrates. (Given at Beaufort.) Not open to undergraduates who have taken Biology 176L. Prerequisite: introductory biology (Biology 21L and 22L). C-L: Biology 274L and Marine Sciences. One and one-half courses. *Dimock (visiting summer faculty)*
298. Special Topics. One-half or one course. *Staff*

COURSES CURRENTLY UNSCHEDULED

- 210, 210L. Forest Pathology
- 224S. Molecular and Cellular Adaptations of Marine Organisms
- 254, 254L. Advanced Research Training in Marine Molecular Biology and Biotechnology

Environmental Sciences and Policy Program

Professor Kramer, *Director*

A major is available in this program.

The undergraduate major in environmental sciences and policy is offered within the Bachelor of Arts degree to students interested in the interdisciplinary study of environmental issues. The major permits students to combine studies in the natural sciences and engineering with courses in social sciences and humanities around general focus areas and themes. This major is specifically designed for students with career objectives such as environmental law, policy, science, management, or planning that require in-depth understanding of environmental issues that cross traditional disciplinary boundaries.

Elective courses for the major are taught by more than sixty Duke professors in twenty cooperating departments and schools. The prerequisites for this major stress a firm foundation in basic natural and social science areas. An introductory core course focuses on local, regional, and global case histories from the perspective of an interdisciplinary team of faculty. Upper-level courses are selected in consultation with advisors to match a specific environmental theme or career objective. The upper-level curriculum includes a course in probability and statistics, an upper-level seminar, and an independent study, internship, or field experience. At least two courses in the upper-level curriculum must be selected from approved lists in each of the social sciences/humanities and sciences/engineering. The program is administered by its director and an advisory committee representing the various areas and cooperating departments.

Advising: Advisors are assigned based on students' general areas of interest. Students present a proposed plan of study to their advisors that emphasizes the connections among their courses. This proposal is normally completed by the end of the sophomore year. The program encourages close relationships between faculty and students with convergent interests.

Independent Study, Internship, or Field Experience. All students in the program will complete either an independent study, internship, or a field experience related to their proposed course of study. The director's office, in collaboration with Duke's Career Development and Counseling Office, maintains a file of available internships. Field experiences may include a semester or summer session at the Duke University Marine

Laboratory, one of several approved study abroad programs, or studies at over thirty field laboratories.

Grants and Awards. Grants and awards are administered through the office of the Environmental Sciences and Policy Program. These include support for independent studies, internships, and field studies.

ENVIRONMENTAL SCIENCES AND POLICY COURSES (ENV)

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

101. Introduction to Environmental Sciences and Policy. (SS) Application of basic principles of natural science, environmental economics and policy, engineering, and ethics to local, regional, and global environmental issues. Not open to first-year students. One course. *Staff*

105. Global Environmental Geography. (NS) Global spatial patterns of natural phenomena and the human modification of those patterns. Introduction to earth/sun relations, climatology, biogeography, and geomorphology. One course. *Staff*

181, 182. Special Topics in Environmental Sciences and Policy. Content to be determined each semester. Consent of instructor required. One course each. *Staff*

191, 192. Independent Study. Open to qualified juniors and seniors with consent of instructor and director of undergraduate studies. Variable credit. *Staff*

THE MAJOR

Corequisites. The following courses or their equivalents (for example, Advanced Placement credit) are required. Approval to substitute courses taken at other universities must be obtained from the director of undergraduate studies in the department offering the course. Some of these courses are prerequisite to some upper-level courses in this major.

Biology 21L. Introduction to Organismal and Environmental Biology

Biology 22L. Introduction to Cellular and Developmental Biology

Chemistry 11L and 12L. Principles of Chemistry, or Chemistry 23L. Advanced General Chemistry

Economics 2D or 52D. Competition, Monopoly, and Welfare

Geology 41. Introduction to Geology

Mathematics 31 and 32. Introductory Calculus I and II

Major Requirements.

1. **Introductory Core Course:** Environment 101.
2. **Environmental Policy.** One course from an approved list of environmental policy courses.
Approved courses include:
Public Policy Studies 107/Political Science 107. Comparative Environmental Policies
Public Policy Studies 149. United States Environmental Policy
3. **Probability and Statistics.** One course from an approved list dealing with statistical inference and probability theory. Approved courses include:
Political Science 138. Quantitative Political Analysis
Public Policy Studies 112. Statistics and Public Policy
Psychology 117. Statistical Methods
Statistics 110. Statistics and Data Analysis in the Social Sciences
Statistics 112. Introduction to Applied Statistics
Sociology 133. Statistical Methods
Environment 251. Natural Resources Data Analysis

4. *Focused Study*. Six upper-level courses proposed by students in consultation with their advisors to fit a particular theme or career objective. At least two of these courses must be selected from approved lists in each of the social sciences/humanities and sciences/engineering. These lists are available from the director of undergraduate studies of the program. One course must be an upper-level seminar or small-group learning experience.
5. *Independent Study/Internship/Field Experience*. Students will complete an approved independent study, internship, or field experience which may or may not include course credit toward upper-level requirements. A letter must be submitted to the director of undergraduate studies from the faculty member, advisor, or supervisor verifying completion of the requirement.

(Note: Courses in a major may count toward only two areas of knowledge for the general studies requirement of the curriculum. Students may not use more than six professional school credits toward the Bachelor of Arts degree.)

Honors. A program for graduation with distinction in environmental sciences and policy is available. See the section on honors in this bulletin. The director of undergraduate studies can provide more details.

Evolutionary Biology

See Biology.

Film and Video Program

Associate Professor Gaines, *Director*

A certificate, but not a major, is available in this program.

The Program in Film and Video is an interdisciplinary course of study which introduces students to the critical analysis of communications technologies: film, photography, and television. Practical production experience is also available through course work and internships. Courses in this area are offered through ten different academic departments and programs and taught by twenty faculty members. The program also sponsors speakers, video art screenings, and exhibits in cooperation with the Center for Documentary Studies, the Institute of the Arts, the Center for International Studies, the University Art Museum, the Literature Program, Asian and African Languages and Literature, and the Mary Lou Williams cultural center. Visiting independent filmmakers are brought to campus under the auspices of the Film and Video Program in conjunction with Screen/Society and Freewater exhibitions.

Students working toward a certificate in film and video declare a major in an academic department. To qualify for the certificate, students take five courses from the approved list published in this bulletin. One of these courses must be an introductory course selected from those listed below. Program courses are described under the listings of the various departments.

Introductory Courses

Cultural Anthropology 110. Advertising and Society: Global Perspective. C-L: English 120, Sociology 160, and Women's Studies. *Luttrell, W. O'Barr, Smith, or Wilson*

English 101A. Introduction to Film. C-L: Drama 65. *Gaines*

English 101B. Introduction to Cultural Studies. C-L: Literature 102. *Gaines, Radway, Surin, Tompkins, or Willis*

English 182. American Film Genres. C-L: Drama 138. *Clum or Gaines*

Art and Art History

165. Photography. *Noland*

Cultural Anthropology

104. Anthropology and Film. *Litzinger*

110. Advertising and Society: Global Perspective. C-L: English 120, Sociology 160, and Women's Studies. *Luttrell, W. O'Barr, Smith, or Wilson*

Drama

- 111S. Playwriting I. C-L: English 107S. *Staff*
- 112S. Playwriting II. C-L: English 108S. *Staff*

English

- 101A. Introduction to Film. C-L: Drama 65. *Gaines*
- 101B. Introduction to Cultural Studies. C-L: Literature 102. *Gaines, Radway, Surin, Tompkins, or Willis*
- 156. History of Mass Culture in the United States. C-L: Literature 156. *Gaines, Radway, or Willis*
- 183S. Film and Video Theory and Practice. C-L: Drama 131S. *Staff*
- 185. Studies in Film History. C-L: Drama 136 and Literature 187. *Clum, Gaines, or Jameson*
- 187. Melodrama and Soap Opera. C-L: Drama 137 and Women's Studies. *Clum or Gaines*
- 189S. Special Topics in Film. C-L: Drama 197S. *Clum or Gaines*
- 284. Contemporary Film Theory. *Gaines*

German

- 123S. German Film History to 1945. *Risholm*
- 284S. German Film: From Weimar to Fascism. *Risholm*

History

- 104B. A Survey of Latin American History through Film. *TePaske*

Literature

- 25A. Third World Novel and Film. *Staff*
- 30. Special Topics in National Cinema. C-L: Comparative Area Studies. *Staff*
- 31. Special Topics in Hispanic Cinema. *Staff*
- 146. The Canadian Image: Cultural Production in French and English Canada. C-L: Canadian Studies and Comparative Area Studies. *A. Davidson*
- 157. International Popular Culture. *C. Davidson, Gaines, Radway, or Willis*
- 158. Studies in Comparative World Cinema and Television. *Gaines or Jameson*
- 185. Psychoanalysis, Literature, and Film. C-L: Comparative Area Studies, English 181, and Women's Studies. *Gaines*
- 186. Sexualities in Film and Video. *Clum, Gaines, or Moon*
- 194S. Topics in Advanced Film, Video, or Audio Production. *Staff*
- 195S. Documentary Film and Fiction. *Kaplan and Orr*
- 291. Topics in Popular Culture and the Media. *Gaines, Radway, or Willis*
- 294. Theories of the Image. *Gaines or Jameson*

Music

- 169. Hollywood Film Music. *Gillian*

Political Science

- 153, 154. Politics and the Media of Mass Communication. *Paletz*
- 203S. Issues and Problems in Politics and the Media in the United States. *Paletz*

Public Policy Studies

- 154S. Free Press and Public Policy. *Stevens*
- 163S. Telecommunications Policy and Regulation. *Prak*
- 176S. American Communities: A Photographic Approach. C-L: Art 118S. *Harris*
- 177. Advanced Documentary Photography. C-L: Art 119S. *Harris*
- 180S. Writing for the Media. *Eudy or Reid*
- 195S. Entertainment Industry: Policy and Practice. *Frey*

Religion

- 62. Religion and Film. *Hillerbrand*

Romance Studies

- Italian 170. Film and the Italian Novel. *Finucci*
- Spanish 169.02. Spanish Cinema. *Vilarós*

Slavic Languages and Literature

- Russian 130/230. Soviet Cinema. C-L: Literature 178. *Gaines, Jameson, or Lahusen*

Sociology

- 170. Mass Communication. C-L: Canadian Studies and Comparative Area Studies. *Smith*
- 182. The Media in Comparative Perspective. C-L: Canadian Studies, Comparative Area Studies, Interdisciplinary Course 182, and Political Science 180. *Smith*

French

For courses in French, see Romance Studies.

Genetics

For courses in genetics, see Biology and the University Program in Genetics.

The University Program in Genetics

Professor Webster, *Director* (biochemistry); Professor Boynton, *Coordinator of the Certificate Program* (botany); Professors Antonovics (botany), Bastia (microbiology), Counce (cell biology), Cullen (genetics and microbiology), Endow (microbiology), Gillham (zoology), Greenleaf (biochemistry), Hsieh (biochemistry), Joklik (microbiology), Keene (microbiology), Kredich (medicine and biochemistry), Laurie (zoology), Modrich (biochemistry), Nevins (microbiology and genetics), Nicklas (zoology), Raetz (biochemistry), Rausher (zoology), Roses (neurobiology), Shaw (chemistry), Steege (biochemistry), Uyenoyama (zoology), and Ward (immunology); Associate Professors Been (biochemistry), Burdett (microbiology), Greene (biochemistry), Kiehart (cell biology), Kohorn (botany), Kreuzer (microbiology), Linney (microbiology), Schachat (cell biology), and Vilgalys (botany); Assistant Professors Capel (cell biology), Davis (cell biology), Dong (botany), Fehon (zoology), Garcia-Blanco (molecular cancer biology), Garrett (molecular cancer biology), Heitman (genetics and pharmacology), Hershfield (biochemistry), Horowitz (molecular cancer biology), Kaufman (biochemistry), Marchuk (genetics), Markert (immunology), Ostrowski (microbiology), Peterson (genetics), Pickup (microbiology), Seldin (microbiology), Sun (botany), Swenson (molecular cancer biology), Titus (cell biology), and Wharton (genetics and microbiology); Adjunct Professors Drake (National Institute of Environmental Health Sciences), Judd (National Institute of Environmental Health Sciences), Kunkel (National Institute of Environmental Health Sciences), and Resnick (National Institute of Environmental Health Science)

Genetics Program Courses

191, 192. Independent Study. Directed reading and research under the supervision of faculty members from the University Program in Genetics, subject to the consent of the instructor and of the coordinator of the Certificate Program in Genetics. Variable credit. *Staff (Genetics Program)*

For descriptions of the courses below consult the listings under the specified departments in the undergraduate and graduate bulletins.

Principles of Genetics. (Biology 180.) One course. *Antonovics, Laurie, and Sun*

Experimental Cell and Molecular Biology (Biology 184L.) One course. *Armaleo, Boynton, and Kohorn*

Independent Study. (Biology 191 and 192.) Prerequisite: consent of instructor, coordinator of the Certificate Program, and the appropriate director of undergraduate studies prior to registration.

DNA, Chromosomes, and Evolution (Biology 281.) *Laurie and Nicklas*

Molecular Genetics of Organelles. (Biology 283.) One course. *Boynton and Gillham*

Ecological Genetics. (Biology 285S.) One course. *Antonovics*

Evolutionary Mechanisms. (Biology 286.) One course. *Rausher*

Mathematical Population Genetics. (Biology 288.) Calculus required; statistics and linear algebra recommended. One course. *Uyenoyama*

GENETICS CONCENTRATION FOR BIOLOGY MAJORS

Biology majors interested in completing the concentration in genetics available in that major should consult the director of undergraduate studies in biology.

CERTIFICATE IN GENETICS FOR NON-BIOLOGY MAJORS

A certificate is available in the Genetics Program to all non-biology majors. Acceptance into the certificate program is by arrangement with the coordinator of the Certif-

icate Program in Genetics. The program offers students an opportunity to gain expertise in modern genetics with a view to its application to biology, medicine, public policy, law, or engineering. The courses in the certificate program are taught by members of the University Program in Genetics. Further details may be obtained from the Genetics Program office.

Required Courses:

Introductory Biology

Principles of Genetics (Biology 180)

An advanced course in molecular genetics, for example,

Experimental Cell and Molecular Biology (Biology 184L)

One course from among: Biology 160, 164D, 184L, 244, 269, 281, 283, 285S, 286, 288, or Genetics 215*, 227, 268*

Independent study with a member of the Genetics Program (University Program in Genetics 191, 192)

Geology (GEO)

Professor Corliss, *Chair*; Assistant Professor Boudreau, *Director of Undergraduate Studies*; Professors Barber, Haff, Heron, Karson, Kay, Livingstone, Perkins, Pilkey, and Schlesinger; Associate Professors Baker and Malin; Assistant Professors Klein and Rojstaczer

A major or a minor is available in this department.

The department offers introductory and advanced courses in all branches of the earth sciences including coastal geology, environmental geology, hydrology, geochemistry, geomorphology, geophysics, paleontology, petrography, sedimentology, and marine geology. The degree requirements emphasize a broad knowledge of both geology and the associated physical sciences. An option is available for one semester of study at the Duke University Marine Laboratory in Beaufort, North Carolina, to fulfill elective requirements for the degree.

10S. Analysis of Outcrops. (NS) Field interpretation of geologic features. Includes four field trips. Prerequisite: Geology 41 (may be taken concurrently). Half course. *Boudreau*

39S. The Geology of Beaches. (NS) Emphasizes field observation (seven full field days plus a weekly lecture) of geological and near-shore oceanographic processes and their role in the evolution of developed and undeveloped beaches and barrier islands. The interaction of human and coastal processes, including the problems of shoreline stabilization and the implications of global sea level rise. Open only to students in the FOCUS Program, Science, Technology, and Modern Culture. One course. *Pilkey*

41. The Dynamic Earth. (NS) Dynamic systems studied include volcanoes, earthquakes, sea-floor spreading, plate tectonics; surficial processes such as floods, glaciers, landslides, and related phenomena; and the composition of the earth including rocks and minerals. One course. *Baker, Heron, Klein, or Perkins*

43S. Application of Geologic Principles. (NS) Mineral and rock classification, topographic and geologic map interpretation. Prerequisite: Geology 41 (may be taken concurrently). Half course. *Staff*

45. Earth Systems. (NS) An introduction to environmental geography with a focus on land, air, and water resources. One course. *Rojstaczer*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

53. Introductory Oceanography. (NS) Basic principles of physical, chemical, biological, and geological oceanography. Fee for required field trip to the Marine Laboratory. C-L: Biology 53. One course. *Pilkey and Searles (biology)*

105L. Fundamentals of Mineralogy. (NS) Crystal chemistry, crystal physics, mineral identification, and genesis. Lectures or recitations, laboratory, and field trips. Prerequisite: Chemistry 12L (may be taken concurrently). One course. *Klein*

106L. Igneous and Metamorphic Rocks. (NS) Silicate mineralogy, theory of origin and classification of igneous and metamorphic rocks, and rock identification. Lectures and laboratory. Prerequisite: Geology 105. One course. *Boudreau*

110L. Stratigraphy and Sedimentology. (NS) Age relationships, correlation, classification, identification, origins, and interpretation of sediments. Lecture, laboratory, and field trip. One course. *Heron and Perkins*

112. Tropical Marine Geology. (NS) Overview of interaction between marine organisms, sediment production and alteration, depositional processes, and environments of deposition. Application of modern analogs to interpreting the Pleistocene rock record of South Florida and the Caribbean. Prerequisite: Geology 41, or Biology 21L or 22L, or consent of instructor. One course. *Perkins*

115. Beaches and Coast: Life is a Beach? (NS) Oceanographic and geologic processes responsible for the evolution of beaches, barrier islands, and other coastal types with coastal management implications. Prerequisite: Geology 41 or consent of instructor. One course. *Heron and Pilkey*

117S. Field Mapping. (NS) An introduction to the techniques used to produce a geologic map. Weekend field trips to map locations of interest. Prerequisite: Geology 41. Half course. *Boudreau or Karson*

120. Environmental Geology. (NS) The relation between the human environment, the properties of earth materials, and the occurrence of geological surface processes such as floods, landslides, and erosion. Prerequisites: Geology 41 and Mathematics 31. One course. *Haff and Rojstaczer*

121. The Surface of the Earth. (NS) Effects on the earth's surface of wind, water, ice, weathering, volcanism, tectonics, and human activity. Origin and nature of landforms. Prerequisite: Geology 41. One course. *Haff*

123. Hydrology. (NS) The hydrologic cycle with particular emphasis on surface water flow and associated sediment transport. Prerequisite: Mathematics 32 or consent of instructor. One course. *Rojstaczer*

130. Principles of Structural Geology. (NS) Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 110. One course. *Karson*

145. Invertebrate Paleontology. (NS) Biologic and stratigraphic relationships of invertebrates and their phylogeny. Lectures and laboratory. Prerequisite: Geology 72 or consent of instructor. One course. *Corliss*

151S. Global Change. (NS) Analysis of the causes and geological record of climatic change; emphasis on the Holocene. One course. *Baker*

160. Ocean and Atmosphere Dynamics. (NS) Introduction to the dynamics of ocean and atmospheric circulations, with particular emphasis on the global climate cycle. Prerequisites: Mathematics 31 and 32, Physics 51 and 52 (or Physics 53 and 54), or consent of instructor. One course. *Lozier*

172L. History of the Earth. (NS) Evolution of the earth and organisms through time. Weekend field trip to the Appalachian Mountains. Lectures and laboratory. Not open to students who have taken Geology 72L. Prerequisite: Geology 41 or consent of instructor. One course. *Corliss or Klein*

191, 192. Independent Study. Directed reading or research. Open only to qualified juniors and seniors by consent of director of undergraduate studies and supervising instructor. One course each. *Staff*

195. Independent Study for Nonmajors. Open to qualified juniors and seniors upon approval of the departmental faculty. One course. *Staff*

196. Beach and Island Geological Processes. (NS) Processes affecting evolution of beaches and barrier islands with emphasis on the effect of constructions. (Given at Beaufort on three weekends.) C-L: Marine Sciences. Half course. *Pilkey*

FOR ADVANCED UNDERGRADUATES AND GRADUATES

200. Beach and Coastal Processes. (NS) The study of sedimentary processes and geomorphology of nearshore environments with emphasis on both developed and undeveloped barrier island systems. One course. *Pilkey*

201. Physical Processes in Coastal Environments. (NS) The physical processes on beaches, the inner continental shelf, and in estuaries, in the context of their implications for the biological and geological environments. Topics to be drawn from the origin of waves and currents, tides, turbulence and mixing transport of sand and larvae. Applications to biomechanics and coastal erosion, and to marine ecology, coastal zone management, and water quality. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32. C-L: Environment 222 and Marine Sciences. One course. *Howd*

203. Physical Oceanography. (NS) Introduction to the dynamic principles of ocean circulation with an emphasis on large temporal and spatial scales of motion. Topics include wind-driven and density-driven flow, western boundary intensification, mid-ocean, shelf, and tropical circulations. Corequisite: Geology 250. Prerequisites: Mathematics 31 and 32 or consent of instructor. C-L: Environment 290 and Mechanical Engineering 290. One course. *Lozier*

204. Advanced Topics in Nearshore Processes. (NS) Advanced treatment of fluid processes in the nearshore. Topics drawn from nonlinear wave theory, radiation stresses and their gradients, forced and free infragravity waves, and the origins of mean currents in the surf zone. Other topics following students' interests. (Given at Beaufort.) Prerequisite: Environment 290, Mathematics 111 or 114, or consent of instructor. C-L: Environment 268 and Marine Sciences. One course. *Howd*

205. Geological Oceanography. (NS) The geology of ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. (Given at Beaufort.) C-L: Environment 291 and Marine Sciences. One course. *Staff*

206S. Principles of Geological Oceanography. (NS) Geological aspects of the ocean basins including coastal to deep water sediment types and sedimentation processes, sea floor physiography and environmental problems. One course. *Pilkey*

208S. Paleoceanography. (NS) Geology, paleoceanography, and evolution of the oceans, ocean basins, and marine biota based on analysis of deep-sea sedimentary sequences. One course. *Corliss*

214S. Sedimentary Petrography. (NS) Descriptive and interpretive analysis of sediments and sedimentary rocks in thin section, with an emphasis on diagenesis. Consent of instructor required. One course. *Perkins*

215. Clastics Facies Analysis: Recent and Ancient. (NS) Modern clastic depositional systems and their ancient analogs. Prerequisite: Geology 110L. One course. *Heron*

216. Field Analysis of South Florida Carbonates. (NS) Analysis of recent sediments and organisms and their Pleistocene analogs. One-week field trip. Pass/fail grading only. Prerequisite: Geology 110L or consent of instructor. Half course. *Perkins*

218. Geological Fluid Mechanics. (NS) Physical properties of fluids. Continuity, momentum, and energy principles. Laminar and turbulent flow; potential flow; open channel flow. Applications to stream and watershed hydraulics, sediment transport, and other geological phenomena. Corequisite: Geology 250. Prerequisites: Engineering 75L, Mathematics 31 and 32, or Physics 41L and 42L. One course. *Haff*

219. Sediment Transport. (NS) The processes by which wind and water move sedimentary material. Corequisite: Geology 250. Prerequisites: Civil Engineering 122L or Geology 41 and 218. One course. *Haff*

220. Earth Surface Processes and Geomorphology. (NS) The origin, nature, and significance of natural features on the earth's surface. Content varies from year to year. Prerequisites: open to graduates and advanced undergraduates with consent of instructor. One course. *Haff*

221. Hydrogeology. (NS) Theory of groundwater flow and solute transport with application to geologic processes. Corequisite: Geology 250. Prerequisite: Chemistry 12L, Mathematics 103, Physics 42L or 52L, or consent of instructor. One course. *Rojstaczer*

222L. Statistics and Data Analysis in Earth and Ocean Science. (NS) Techniques commonly used by earth and ocean scientists for the analysis of spatial and/or temporal series of data. Topics include regression, Fourier analysis, nonparametric spectral analysis, and, perhaps, principal components analysis and parametric spectral estimators. (Given at Beaufort.) Prerequisites: Mathematics 31 and 32, Statistics 110 or 112, or consent of instructor. C-L: Environment 252L and Marine Sciences. One course. *Howd*

223. Numerical Methods in Hydrogeology. (QR) Forward and inverse modeling of groundwater flow and transport. Corequisite: Geology 250. Prerequisite: Computer Science 8 or 53, Geology 221, Mathematics 103, or consent of instructor. One course. *Rojstaczer*

225S. Advanced Topics in Hydrogeology. (NS) Hydrologic controls on the chemical and physical state of the earth's crust. Prerequisite: Geology 221 or consent of instructor. One course. *Rojstaczer*

233S. Oceanic Crust and Ophiolites. (NS) Structure, tectonics, petrology, and geochemistry of oceanic spreading environments and ophiolite complexes. Prerequisites: Geology 106L and 130 or consent of instructor. One course. *Karson*

237S. Structure and Evolution of the Appalachian Orogen. (NS) Overview of sedimentation, deformation, and metamorphism responsible for the development of the Appalachian Mountain Belt from Newfoundland to Alabama in the context of plate tectonics. Prerequisites: Geology 106L, 110L, and 130 or consent of instructor. One course. *Karson*

249. Marine Micropaleontology. (NS) Introduction to marine microfossils, basic principles of micropaleontology and stable isotope geochemistry with applications to paleoceanography. Lectures and laboratory. One course. *Corliss*

250. Mathematical Methods in Geology. (QR) Overview of quantitative methods used in geologic modeling and data analysis. Prerequisites: Geology 41, Mathematics 32, Physics 41L and 42L. One course. *Staff*

251. Introduction to Geophysics. (NS) A survey of the earth's heat flow, gravitational, magnetic, and electrical potential fields, and global seismology. Derivation of basic relationships and their application to the solution of geological problems.

Corequisite: Geology 250. Prerequisite: upper-division mathematics or science courses. One course. *Malin*

252. Seismic Exploration of the Lithosphere. (NS) A survey of seismic wave generation, propagation, detection, analysis, and interpretation in the continental and oceanic lithosphere with practical applications to geological and industrial problems. Prerequisites: upper-division mathematics or science courses and Geology 250. One course. *Malin*

255. Theoretical Geophysics I: Diffusion and Wave Motion in the Earth, Part I. (NS) Theoretical and practical quantitative methods for seismological and groundwater research. Differential and integral equations for diffusion and wave motion; analytical solutions and numerical methods. Elementary continuum mechanics. Time series analysis. Emphasis varies depending on enrollment. Prerequisite: enrollment in an advanced degree program in earth sciences or related fields, or consent of instructors. One course. *Malin and Rojstaczer*

256. Theoretical Geophysics II: Diffusion and Wave Motion in the Earth, Part II. (NS) Theoretical and practical quantitative methods for seismological and groundwater research. Differential and integral equations for diffusion and wave motion; analytical solutions and numerical methods. Elementary continuum mechanics. Time series analysis. Emphasis varies depending on enrollment and the contents of Geology 255. Prerequisite: Geology 255 or consent of instructors. One course. *Malin and Rojstaczer*

258S. Advanced Topics in Geophysics: Interdisciplinary Approaches to Problems in Tectonics, Seismology, and the Environment. (NS) Crustal structure of the western United States; use of seismic reflection and microearthquake data for imaging active geological processes, earthquake prediction; scattering of seismic waves. Consent of instructor required. One course. *Malin*

269. Theoretical Geochemistry. (NS) Introductory thermodynamics applied to geologic problems through understanding of phase equilibrium. Prerequisites: Geology 105L (may be concurrent) and Mathematics 32. One course. *Boudreau*

272. Biogeochemistry. (NS) Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12L or equivalent. C-L: Biology 272. One course. *Schlesinger*

273S. Analytic Techniques. (NS) An introduction to advanced analytic procedures used in the earth sciences: such as electron microbeam techniques (scanning electron microscopy, electron microprobe analysis) and plasma emission/absorption spectroscopy. Consent of instructor required. One course. *Boudreau and Klein*

275. Economic Geology. (NS) Geology and geochemistry of ore deposits. Consent of instructor required. One course. *Baker and Boudreau*

285S. Layered Intrusions. (NS) Survey of layered igneous intrusions and current theories on crystallization and other processes in mafic magmas. Offered alternate years. Prerequisites: Geology 105L and 106L or consent of instructor. One course. *Boudreau*

292. Computer Methods in Geology. (NS) Techniques used in the geological sciences including simulation and forward modeling, inverse and least squares methods, statistical methods and exploratory data analysis as well as graphics. Prerequisites: Computer Science 53 and Mathematics 32, or consent of instructor. One course. *Staff*

295S. Advanced Topics in Geology. (NS) Topics, instructors, and credits to be arranged each semester. Variable credit. *Staff*

COURSES CURRENTLY UNSCHEDULED

217. Field Analysis of Ancient Sedimentary Sequences. (NS)

230S. Advanced Topics in Structural Geology and Tectonics. (NS)

236S. Lithosphere Plate Boundaries. (NS)

260S. Applied Subsurface Stratigraphy. (NS)

270. Sedimentary Geochemistry. (NS)

271. Isotope Geochemistry. (NS)

283S. Experimental Methods in Geology. (NS)

THE MAJOR

The Department of Geology offers one A.B. option and three B.S. tracks for a major in the department.

For the A.B. Degree

The A.B. degree in earth sciences is designed to be a flexible major for those students whose interest is in the professional fields allied to geology (for example, land use planning, resources management, environmental law, engineering geology, or secondary education). It is not intended for those who plan on pursuing advanced studies in the earth sciences or becoming professional geologists.

Prerequisites. Geology 41, 43S (half course), 53; Chemistry 11L and 12L, Mathematics 31 and 32, Physics 41L and 42L (or 51L and 52L, or Physics 53L and 54L).

Major Requirements. Geology 172L and seven additional courses, 100-level or above, including at least three in geology, that are related to the student's interest. These courses must be approved in advance by the director of undergraduate studies, who may consult with the student's advisor.

For the B.S. Degree

Prerequisites. Geology 41, 43S (half-course), and 53; chemistry 11L and 12L; Mathematics 31 and 32; either Physics 41L and 42L (or Physics 51L and 52L, or Physics 53L and 54L) or Biology 21L and 22L (for the biological oceanography option only).

The Department of Geology offers *three* programs leading to a B.S. degree:

Geology: Preparatory to Advanced Studies in Geology

The B.S. degree in geology provides a strong background for graduate work in the earth sciences for those who wish to become academic or professional geologists in any of its many subfields.

Major Requirements. Required courses include Geology 105L, 106L, 110L, 130, 172L, Statistics 110 or 112, a field course normally taken during the summer after the junior year, and two electives above Geology 100 (or approved substitutions*).

Although not specifically required, students interested in advanced studies in the following fields should consider taking the additional courses during their undergraduate career, and with the advice of their faculty advisor.

Students interested in advanced studies in *geochemistry*, *hydrogeology*, *petrology*, or *structural geology* should consider taking the following additional courses: second-year mathematics (ordinary differential equations, linear algebra), computer programming, and physical chemistry.

Students interested in advanced studies in *geophysics* should consider taking the following additional elective geology courses: Geology 251, 255, 256, and 258. In addition, they should also consider taking courses in classical mechanics, electricity and

magnetism, second-year mathematics (ordinary differential equations, linear algebra), and mathematical physics.

Students interested in advanced studies in *paleontology* should consider taking the following additional elective geology courses: Geology 145, 208, 249. They should also consider taking additional postintroductory courses in anatomy, biology, botany, and ecology.

Geology: Preparatory to Advanced Studies in Oceanography

The B.S. in oceanography is designed for those who wish to pursue advanced studies in geological oceanography and biological oceanography.

Major Requirements. Geology 160, Statistics 110 or 112. Four from one of the following options: Geological Oceanography option: Geology 105L, 110L, 112L, 172, 203, 206, Biology 114, Biology 115. Biological Oceanography option: Geology 112, 172, 203, 206, 208, Biology 110, Biology 114, Biology 115, Biology 123, Biology 150. For both options, two elective 100-level or above geology courses (or approved substitutions*) are required.

Although not specifically required, students interested in advanced studies in *geological oceanography* should consider taking the following additional courses during their undergraduate careers with the advice of their faculty advisor: second-year mathematics (ordinary differential equations, linear algebra), computer programming, organic and physical chemistry. Students interested in *biological oceanography* should consider taking additional postintroductory courses in biology, botany, and ecology.

Geology: Preparatory to Advanced Studies in the Environmental Earth Sciences

Interested students may work with departmental faculty members to plan a specialized course sequence in a variety of areas relating to environmental earth sciences. Areas of specialization include coastal studies, global change, hydrology, earth surface processes (geomorphology), and environmental geology. Courses in these areas can be combined with related courses in departments such as botany, civil and environmental engineering, zoology, and the School of the Environment to create an educational experience tailored to individual student interests.

Major Requirements. Geology 120, 123, 160, 172; Statistics 110 or 112. Three 100-level or above courses in Geology (or approved substitutions*).

Additional recommended courses. Students interested in advanced studies in environmental earth sciences should consider taking additional courses in the following fields during their undergraduate careers with the advice of their faculty advisor: second-year mathematics (ordinary differential equations, linear algebra), computer programming, and postintroductory chemistry courses. Students who are interested in field research are strongly urged to take a semester at the Beaufort Marine Lab or a geology summer field course, but note that geology summer field camps usually require Geology 106, 110, and 130 as prerequisites.

THE MINOR

Prerequisites. Geology 41, 43S (half course), 53; Chemistry 11L and 12L; Mathematics 31 and 32; Physics 41L and 42L (or Physics 51L and 52L, or Physics 53L and 54L).

Minor Requirements. Geology 172L and four additional 100-level courses or above, with at least two in geology, that are related to the student's interest. These courses must

*Approved elective course substitutions: Mathematics 103, 104, 111, 114, Chemistry 151, 161, Computer Science 50, Physics 181, 182, 230, 231. Others with approval of the Department of Geology faculty and the director of undergraduate studies.

be approved in advance by the director of undergraduate studies, who may consult with the student's advisor.

HONORS/DISTINCTION

The department through Trinity College offers Latin honors by honors project and graduation with distinction by honors project.

A candidate for Trinity College Latin honors by honors project must have an overall grade point average of 3.3 and a departmental grade point average of 3.5 at the beginning and end of the project to qualify for departmental nomination. The student will apply for consideration in the honors program by the end of his or her junior academic year by writing a letter of intent to the director of undergraduate studies. A committee of three faculty members, including the director of undergraduate studies, will review the student's record and decide to admit or reject the application. If the student is accepted, a faculty member within the department will be assigned to work with the student as an advisor to the honors project. This project will consist of an original piece of scientific research which will be summarized by a written report in the style of a scientific publication in geology before the end of classes of the final semester. The student will normally do the work as part of an independent study course (Geology 191, 192), but it may be part of other course work as well. The student will also make an oral presentation to students and faculty of the department before the end of classes of the final semester. The decision on granting honors will be made by a vote of the faculty, with a majority in favor needed to grant honors. Students who are not granted honors will receive credit for the independent study. For the graduation with distinction program a candidate must have a departmental average of 3.0 at the beginning and end of the project to qualify; the procedures are otherwise identical to those listed above for Latin honors by honors project.

TEACHER CERTIFICATION

A geology major who is interested in teaching in secondary schools is encouraged to earn a Comprehensive Science teaching certificate in addition to the bachelor's degree. The teaching certificate, which is earned by fulfilling requirements prescribed by the state of North Carolina, is generally accepted in most of the fifty states by reciprocal agreement.

In addition to completion of any of the geology major tracks as described above (the A.B. option is particularly suited for those interested in a teaching certificate), the requirements for the Comprehensive Science teaching certificate include course work in biology, chemistry, physics, an appropriate course in psychology, and several courses in education. The last semester of the senior year is devoted to the student-teaching block, including two special, accelerated courses and ten weeks of full-time teaching and observation in the schools, working with a certified teacher and with Duke faculty. Anyone considering secondary school teaching should confer with the director of undergraduate studies as well as Professor Malone in the Program in Education as soon as possible.

Germanic Languages and Literature

Professor Rolleston, *Chair*; Professor Borchardt, *Director of Undergraduate Studies*; Assistant Professor Walther, *Supervisor of Freshman Instruction*; Professor Alt; Associate Professor Morton; Assistant Professors Hell, Rasmussen, and Risholm; Professor Emeritus Phelps; Lecturers Dowell and Johns

A major is available in this department.

GERMAN (GER)

Language

1-2. Elementary German. (FL) Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory and the computer. Two courses. *Walther and staff*

14. Intensive German. (FL) Accelerated introduction to German, combining in one semester the work of German 1-2. Classroom theory and practice with extended exposure to language laboratory and computer programmed instruction. Consent of director of undergraduate studies required. Two courses. *Staff*

15. German for Reading Knowledge. (FL) Foundations of German grammar and syntax; emphasis on vocabulary and complex verbal structures. Not open for credit to students who have completed German 1-2, 14, or the equivalent. Students continuing German after German 15 should take the placement test. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

German 66, 67, and 69 are usually followed by 100S, 117S, 121S, or 122S.

65-66. German in Review. (FL) Grammar review, reading of literary and cultural texts, oral practice, laboratory, and computer programmed instruction. Not open to students who have had German 63. Prerequisite: for German 65-66, German 1-2, 14, or equivalent; for German 66 alone, appropriate placement test score or consent of instructor. Two courses. *Dowell*

67. Intensive Intermediate German. (FL) Intensive grammar review and practice of spoken and written German combining in one semester the work of one year of intermediate German. Taught only in the Berlin Fall Semester Program. Prerequisite: German 1-2, 14, or equivalent. Two courses. *Staff*

69. Accelerated Intermediate German. (FL) Intensive grammar review covering principles of syntax, expanded vocabulary and use of idiomatic expressions in the context of reading, speaking, and writing. Consent of instructor required. Prerequisite: German 1-2, 14, or equivalent. One course. *Dowell*

99. Introduction to German. Course credit for a score of 4 or 5 on the College Board Advanced Placement tests in German. One course.

100S. Business German. (FL) Introduction to the language of commerce and industry; modes of expression for technology and marketing. Consent of instructor required. One course. *Dowell*

117S, 118S. German Conversation and Composition. (FL) Primarily conversation with oral and written reports, based on works by contemporary writers. Required for German majors; other students by consent of instructor. One course each. *Dowell or Johns*

Literature and Culture

121S, 122S. Introduction to German Literature. (AL, FL) Principal authors, genres, concepts, and works of German literature. 121S: Middle Ages to the Baroque. 122S: Enlightenment to the present. One course each. *Staff*

123S, 124S. Undergraduate Seminars. (AL, FL) Topics vary. One course each. *Staff*

125S. Literature of Tolerance. (AL, FL) The liberal tradition in German letters from the Reformation through the Enlightenment to the twentieth-century religious and political dissent. One course. *Borchardt*

130S. From Enlightenment to Classicism. (AL, FL) The major literary and cultural movements of the eighteenth century: Enlightenment, sentimentalism, *Sturm und Drang*, Weimar classicism. Representative works of Lessing, Klopstock, Herder, Goethe, Schiller, and Lenz. One course. *Morton*

131S. The Novelle. (AL, FL) The unique German prose genre from Tieck, Kleist, Grillparzer, Keller, Droste-Hülshoff to Hauptmann, Kafka, and Grass. History and theories from romanticism to naturalism. One course. *Alt or Morton*

136S. Contemporary Germany. (AL, FL) The current literary scene in its cultural, social, and political contexts. C-L: Comparative Area Studies. One course. *Hell*

137S. Introduction to Twentieth-Century German Women Writers. (AL, FL) This century's preeminent German women writers placed in historical and cultural context. Elementary concepts of literary analysis; emphasis on speaking and writing German. Readings in Bachmann, Seghers, Wolf. Other authors may include: Aichinger, Fleisser, Frischmuth, Kaschnitz, Leutenegger, Morgner, H. Müller, Rinser, Struck. C-L: Women's Studies. One course. *Hell or Rasmussen*

Courses Taught Overseas

119S. Advanced German Language and Culture. (CZ, FL) Advanced grammar review with emphasis on phonetics and conversation, literature, films, museums, and theater performances. Taught only in the Berlin program. Fulfills requirements for German 117S and 118S. Prerequisite: German 65-66, or German 67 or 69. Two courses. *Wohlfel*

150. Advanced Grammar, Composition, and Current Issues. (FL) Advanced grammar review with emphasis on German expository style. Discussion of current events based on newspaper articles, videos, and television programs. Offered as a part of the summer program at the University of Erlangen. One course. *Koeppel*

151S. Advanced Intensive German. (FL) For advanced students to increase all four language skills: comprehension, speaking, reading, and writing. Discussion of current events based on newspaper articles, radio and television reports. Preparation for the German language examination required of all foreign students enrolling at German universities. Equivalent of German 117S or 118S but offered only in the Berlin semester program. One course. *Staff*

152S. Berlin in Literature and Culture. (AL, FL) Literary works of modern German writers; focus on the city of Berlin and its unique cultural and political heritage due to Germany's division from 1945-1989. Emphasis on art and architecture of Berlin reflecting both historical trends and political ideologies such as National Socialism and Marxism. Taught only in the Berlin semester program. C-L: Comparative Area Studies. One course. *Wohlfel*

153. Aspects of Contemporary German Culture. (CZ, FL) Site visits, lecture, and discussion. Offered as part of the summer program at the University of Erlangen. C-L: Comparative Area Studies. One course. *Staff*

155. Advanced German Cultural Studies. (CZ, FL) Topics vary. Taught in German and only in the Berlin Semester Program. Prerequisite: P.N.d.S. (successful completion of German Language exam administered by the Free University). One course. *Staff*

Courses Taught in English

123A, S. Special Topics. Taught in English by visiting faculty. One course. *Staff*

160. German Life and Thought. (CZ) A survey of what the well-educated German knows about German-speaking Europe, from antiquity to the present, with a stress on

generally less familiar periods. Architecture, art, education, literature, music, philosophy, and science. Taught in English. C-L: Comparative Area Studies. One course. *Borchardt*

164S. Medieval German Literature. (AL) Outstanding medieval texts in relation to contemporary literary theory: *Tristan and Isolde*, *The Nibelungenlied*, *Wolfdietrich*, poetry by Walther von der Vogelweide, ballads, religious texts. Taught in English. C-L: Medieval and Renaissance Studies. One course. *Rasmussen*

165S. The Vikings and their Literature. (AL) Old Norse culture and literature. Texts include the older and younger *Edda*, *Njal's Saga*, *Volsungasaga*, *Vinlandssaga*. Taught in English. C-L: Medieval and Renaissance Studies. One course. *Rasmussen*

180. Faust and the Faust Tradition. (AL) Goethe's great work in the context of its intellectual and cultural inheritance and legacy. Taught in English. One course. *Borchardt or Morton*

248S. German Film from Weimar to Fascism. (AL, CZ) German film from its inception through the Nazi period. Emphasis on the social, political, and cultural background of the period as well as specifics of film form and analysis. Focus on areas such as expressionist cinema, the realist film, Nazi propaganda and entertainment films. Taught in English. One course. *Risholm*

249S. New German Cinema. (AL, CZ) Postwar German film beginning with the popular "homeland" film and moving on to New German Cinema, emphasizing the social, political, and cultural background of the period. Diverse topics such as feminist filmmaking, auteur artists, contemporary cinema, and the Nazi past. The writings of filmmakers as well as theoretical issues in film criticism. One course. *Risholm*

Independent Study and Honors Seminars

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of the director of undergraduate studies. One course each. *Alt, Borchardt, Hell, Morton, Rasmussen, Risholm, Rolleston, or Walther*

193, 194. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by consent of the director of undergraduate studies. One course each. *Alt, Borchardt, Hell, Morton, Rasmussen, Risholm, Rolleston, or Walther*

197S, 198S. Honors Program Sequence. (AL, FL) 197S: Senior Colloquium; team taught. 198S: Preparation and writing of research paper. See section on *Honors* under description of the major. One course each. *Staff*

For Graduates and Advanced Undergraduates

200S. Proseminar: Introduction to Literary Criticism. (AL, FL) Literary theory within the framework of Germanistik, combining a survey of the major critical approaches which developed after 1945 with the discussion of several paradigmatic readings of literary texts. Approaches studied include New Criticism, hermeneutics, Marxist critical theory, reception aesthetics, structuralism, poststructuralism, and feminist literary criticism(s). One course. *Hell*

201. Introduction to Middle High German: The Language of the German Middle Ages and Its Literature. (AL, FL) Fundamentals of medieval German language acquired through readings in the original Middle High German of Arthurian romance, heroic epic, and courtly poetry. C-L: Medieval and Renaissance Studies. One course. *Rasmussen*

202S. Medieval Seminar. (AL, FL) Topics may include: heroic epic, courtly epic, medieval poetics, German lyric poetry from the twelfth to the fifteenth century. Solid

reading knowledge of modern German and some knowledge of medieval German required. C-L: Medieval and Renaissance Studies. One course. *Rasmussen*

203S. Sex, Gender, and Love in Middle High German Literature. (AL, FL) Historical contexts for emergence of courtly love and the role of desire and interpretation in Gottfried von Strassburg's *Tristan und Isolde*, courtly love lyric, "maere." C-L: Medieval and Renaissance Studies. One course. *Rasmussen*

210S. Renaissance and Reformation. (AL, FL) The development of "personality" from "type" to "individual" in German culture in the great transition from medieval to early modern times, with examples from literature, history, art, architecture, music, science, and religion. Emphasis on the Italian connection, northern mysticism, Prague in the fourteenth century, fifteenth-century poetry and prose, and Luther. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

215S. German Baroque Literature. (AL, FL) German literature of the grand gesture, of performance, of public posture; poetry of rhetoric; prose of the scoundrel, adventurer, and ne'er-do-well. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

225S. Introduction to Goethe. (AL, FL) Major works of lyric, narrative, drama, and theory, throughout Goethe's career. One course. *Morton*

226S. Goethe's *Faust*. (AL, FL) Goethe's masterpiece and life's work, conceived as a summation of Western literature and mythology for the modern age. One course. *Morton*

227S. Goethe Seminar. (AL, FL) Selected texts or other aspects of Goethe's life and work not treated in German 225S or 226S. Topics may include autobiography, scientific writings, longer novels, late lyrics, literary theory and criticism, as well as others. One course. *Morton*

229S. Schiller: Aesthetic Theory and Practice. (AL, FL) The nature and function of the artist and the work of art, in Schiller's essays, poetry, and dramas. One course. *Borchardt, Morton, or Rolleston*

230S. German Romanticism. (AL, FL) The emergence in the 1790s of a new cultural language: categories of self, history, interpretation, irony, and revolution. Theory, fiction, and poetry by Novalis, the brothers Schlegel, Tieck, Brentano, Eichendorff, Hoffmann, and Heine. One course. *Rolleston*

233S. German Theater as Anti-Drama. (AL, FL) The story of modern and postmodern drama with emphasis on Lenz, Büchner, Grabbe, Schnitzler, Brecht, Frisch, Dürrenmatt, Handke, expressionist drama, and Piscator's political theater. C-L: Drama 220S. One course. *Alt*

236S. Empires of the Mind: Nineteenth-Century German Ideas. (AL, FL) Selected topics in politics, religion, society, and history in the nineteenth century: Heine, Hegel, Schopenhauer, Feuerbach, Marx, Nietzsche, Burckhardt, Treitschke, Ranke, D. F. Strauss, Tönnies, Weber, Freud. One course. *Alt*

245S. The Twentieth Century. (AL, FL) The major movements and writers from the expressionists, Thomas Mann, Kafka, Rilke, and Brecht, to Böll, Grass, Handke, and Christa Wolf. Emphasis on relations between text and history: World War I, Weimar, Third Reich, and the struggle to integrate past and present in post-Holocaust literature. One course. *Rolleston*

246. German Letters in the Third Reich and in Exile. (AL, FL) German literature, drama, and film inside and outside Nazi Germany. Theoretical readings in Bloch, Benjamin, and others. One course. *Hell*

247S. Postwar German Literature. (AL, FL) The development of German literature after 1945. Topics vary: German literature between 1945 and the founding of the two states; the GDR novel and the question of realism; GDR drama after Brecht; West German literature. One course. *Hell*

250S. German Literature and Classical Antiquity. (AL, FL) The reception of Greece and Rome in German letters; the triumph and decline of classical rhetoric; the idea of the "classical"; antiquity as model and reproach. One course. *Borchardt*

253S. The Image of America in German Literature. (AL, FL) Selected readings in the myth of America (Jantz's "America in German Poetry and Thought"), including various genres from the eighteenth to the twentieth centuries, specifically texts by Goethe, Heine, Sealsfield, Kürnberger, Willkomm, Gerstäcker, Lenau, Solger, Kafka, Brecht, and Frisch. One course. *Alt*

Linguistics

260. History of the German Language. (FL) Phonology, morphology, and syntax of German from the beginnings to the present. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Rasmussen*

262. Applied Linguistics. (FL) The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. C-L: Linguistics. One course. *Staff*

Courses Taught in English

244A, S. International Expressionism. (AL) Not open to students who have taken Art 244S or German 244S. See C-L: Art 244A. One course. *Cernuschi and Rolleston*

244B, S. International Modernism. (AL) See C-L: Art 244B. One course. *Cernuschi and Rolleston*

270. Consciousness and Modern Society. (CZ) The blend of philosophy, literature, and sociology in German thinking about actual and possible societies. The idea of consciousness as producing involvement, detachment, or transformation. Marx, Nietzsche, Lukacs, Freud, Marcuse, Benjamin, Adorno, and Habermas. Taught in English. C-L: Comparative Area Studies. One course. *Rolleston*

271S. Contemporary Theory and the German Tradition. (AL) The reorientation of Western thought toward theories of knowledge and of language, from the eighteenth century to the present, and the significance of that paradigm shift for contemporary theory of literature and literary criticism. Readings in Kant, Herder, Mauthner, Wittgenstein, Heidegger, Habermas, and Apel. Taught in English. One course. *Morton*

299S. Seminar in German Studies. (CZ) Review of current debates and historical perspectives in the German cultural field, structured through contributing disciplines: social and economic history, political theory and history, literature, fine arts, music, philosophy, and religion. Team-taught, involving a wide range of faculty in the German Studies Program. Taught in English. C-L: Interdisciplinary Course 299S. One course. *Rolleston and staff*

Courses Currently Unscheduled

132S. The Märchen. (AL, FL)

135. German Literature and the Media. (AL, FL)

154. Deutsche Kulturgeschichte. (CZ, FL)

170S. The German Enlightenment and the Invention of Modernity. (AL)

- 174S. *In Search of the Self: The German Bildungsroman*. (AL)
- 184S. *Rilke, Kafka, Mann, Brecht*. (AL)
- 185S. *The Golden 'Twenties*. (AL)
- 220S. *Reason and Imagination: The German Eighteenth Century*. (AL, FL)
- 231S. *Romantic Outsiders*. (AL, FL)
- 232S. *The Lyric: Goethe to the Present*. (AL, FL)
- 235S. *Nineteenth-Century German Literature*. (AL, FL)
- 240S. *Naturalism and Beyond: The Turn of the Century*. (AL, FL)
- 241S. *Nietzsche*. (AL, FL)
- 242S. *Expressionism*. (AL, FL)
- 251S. *Germanic Mythology and Its Critics*. (AL, FL)
- 252S. *The Mystical Tradition*. (AL, FL)
- 254S. *Literature by Women*. (AL, FL)
- 255S. *Paradigmatic Issues in Literary Theory*. (AL, FL)
- 261. *Second-Language Acquisition Theory and Practice*. (FL)
- 272S. *The German Literature of Fantasy*. (AL)
- 273S. *Franz Kafka and Thomas Mann*. (AL)
- 274S. *The Image of America in German Literature*. (AL)
- 275S. *German Women Writers*. (AL)

YIDDISH (YDH)

1, 2. **Elementary Yiddish**. (FL) A thorough study of elementary Yiddish grammar with reading, composition, and oral practice. No previous knowledge of German or Hebrew required. C-L: Judaic Studies. One course each. *Staff*

170. **Special Topics in Literature and the Judaic Tradition**. (AL) See C-L: Literature 131; also C-L: Judaic Studies. One course. *Staff*

Courses Currently Unscheduled

171. **Yiddish Fiction in Translation**. (AL)

191, 192. **Independent Study**

THE MAJOR

Students majoring in German develop language skills in their cultural and literary context. The international and humanistic emphasis makes the German major an appropriate companion to technical and career-oriented concentrations. Numerous opportunities are available, including programs of study abroad, interdisciplinary programs, and Fulbright and German Academic Exchange Service (DAAD) scholarships.

Prerequisites. Elementary and intermediate German.

Major Requirements. Conversation and composition (German 117S, 118S, or equivalent), plus six advanced courses, three of which must be at the 200 level. German 121S

or 122S is required as part of the six-course sequence. Of the courses taught in English, either German 160 or 270 (but not both) may count toward the major.

Honors/Distinction. Qualified students (see the section on honors in this bulletin) may apply or be invited to apply for graduation with distinction or to achieve Latin honors by project. The application deadline is preregistration for the fall semester of the senior year. Further information may be obtained from the director of undergraduate studies or the departmental honors representative.

Greek

For courses in Greek, see Classical Studies.

Health, Physical Education, and Recreation (PE)

Professor Buehler, *Chair*; Associate Professor LeBar, *Director of Undergraduate Studies*; Associate Professors Harvey, Raynor, and Skinner; Assistant Professor of the Practice J. Ogilvie; Part-time Instructors Alleva, Beguinnet, Bowen, D. Coffman, T. Coffman, Falcone, Forbes, Gaudet, Hagymas, Hillier, Hopkins, Jindra, N. Ogilvie, Orr, Rollins, Spector, Trout, and Yakola

Courses in this program do not count toward distributional requirements.

ACTIVITY COURSES

The activity courses listed below may be taken by men and women unless otherwise indicated. Each course carries a half-course credit and is given on a pass/fail basis. The maximum amount of credit that counts for the undergraduate degree is one full course, but additional courses may be taken without credit toward graduation. Students may repeat activity courses but will not receive credit for the repeated courses.

10. Bowling. History of bowling; complete fundamentals and techniques; types of games; basic rules and scoring. Half course. *Bowen*

11. Cardiorespiratory Conditioning. Individualized programs in walking, jogging, running, cycling, and swimming. Half course. *Buehler*

12. Aerobic Dance. Dancing for cardiovascular and physical conditioning. Half course. *Jindra*

13. Weight Control. Individualized exercise and diet programs. Consent of physician required. Half course. *Staff*

14. Tension Control. Techniques for recognizing and reducing tension. Half course. *Staff*

15. Weight Training. Progressive, cumulative, and measurable physical conditioning. Half course. *Harvey*

16. Endurance Swimming. Individualized programs to improve skills and fitness. Half course. *J. Ogilvie*

20. Beginning Swimming. Propulsion techniques, water safety, introduction to the five basic strokes. Half course. *J. Ogilvie*

21. Intermediate Swimming. Development of the five basic strokes, overarm side trudgen, and trudgen crawl. Half course. *J. Ogilvie*

22. Lifeguard Training. American Red Cross course which prepares an individual to qualify as a *non-surf* lifeguard. Preventative lifeguarding, emergencies, health and sanitation, water rescue and special situations, search and recovery operations, weather and environmental conditions. Corequisites: must have CPR and Red Cross Standard

First Aid certification by the end of the course in order to receive Lifeguard Training certification. Half course. *Forbes*

23. Water Aerobics. Aerobic and anaerobic exercise performed in water, designed to promote physical conditioning. Half course. *J. Ogilvie*

24. Basic Rescue and Emergency Water Safety. Prerequisite for Water Safety Instructors Course. Half course. *J. Ogilvie*

25. Water Safety Instructors Course. American Red Cross Water Safety Instructors certification. Prerequisite: Physical Education 24. Half course. *Staff*

27. Kayaking. Basic skills for kayaking in whitewater. Half course. *Harvey*

28. Canoeing. Basic skills for canoeing in whitewater. Half course. *Staff*

29. Water Polo. Prerequisite: Physical Education 16 or consent of instructor. Half course. *Forbes*

30. Beginning Golf. Half course. *T. Coffman*

31. Intermediate Golf. Stroke development and use of all clubs. Half course. *T. Coffman*

32. Advanced Golf. Use of all clubs; course strategy. Emphasis on playing. Half course. *T. Coffman*

35. Beginning Racquetball. Half course. *Skinner*

36. Intermediate Racquetball. Strategy of the game; stroke development. Half course. *Skinner*

37. Advanced Racquetball. Development of competitive skills. Half course. *Skinner*

40. Beginning Tennis. Half course. *LeBar*

41. Intermediate Tennis. Strategy of the game and stroke development. Half course. *LeBar*

42. Advanced Tennis. Stroke development with emphasis on strategy. Half course. *LeBar*

50. Mixed Competitive Tennis. Half course. *LeBar*

52. Fencing. Foils, épée, and saber. Half course. *Beguiné*

53. Intermediate Fencing. Further study of basics and theory. Half course. *Beguiné*

55. Self-Defense: Karate. Fundamentals of selected martial arts. Half course. *Bowen*

56. Intermediate Karate. Continued practice of basic technique. Introduction to round kick, back kick, free sparring, four Pinan Katas of the Wadoryu System. Half course. *Bowen*

59. Aikido. A method of unarmed self-defense that encourages discipline and a nonviolent attitude. Half course. *Bowen*

60. Volleyball. Half course. *Hopkins*

62. Intermediate Aikido. A method of unarmed self-defense combining movements taken from sword and spear fighting, jujitsu, and aikijitsu. Half course. *Bowen*

65. Yoga. Traditional hatha yoga combined with balanced structural alignment to develop strength, flexibility, and mental concentration. Half course. *Orr or Spector*

66. Intermediate Hatha Yoga. Continuation of hatha yoga postures and awareness of breathing to develop more flexibility and calmness. Yoga philosophy. Prerequisite: previous experience with yoga. Half course. *Orr*

71. Country/Western Dancing. Texas two-step, East Coast swing, cha-cha, waltz, and country line dancing. Half course. *Trout*

72. Social Dancing. Waltz, foxtrot, tango, cha-cha, rumba, jitterbug, rock, disco, and others. Half course. *Trout*

73. Intermediate Social Dance. Review of dances in Physical Education 72. Advanced movements in these dances and beginning movements in slow dancing, California two-step, and West Coast swing. Introduction to international and modern ballroom dance. Prerequisite: Physical Education 72 or equivalent. Half course. *Trout*

80. Equitation. Skills in balance seat riding: walk, trot, and canter. Half course. *Rollins*

81. Advanced Equitation: Hunt Seat. Cross-country and stadium jumping techniques. Half course. *Rollins*

96. Basketball. Development of individual and team skills. Half course. *Gaudet*

98. Frisbee. Study of basic throwing and catching skills, introduction to rules and tactics of ultimate frisbee, disc golf, freestyle moves, and individual event techniques. Half course. *Staff*

THEORY COURSES

49S. First-Year Seminar. Topics vary each semester offered. One course. *Buehler*

100. Advanced First Aid and Cardiopulmonary Resuscitation. Certification in advanced first aid and CPR. Half course. *Raynor*

115. Care and Prevention of Athletic Injuries. Basic instruction in prevention, recognition, care, and rehabilitation of athletic related injuries. Half course. *Staff*

120. Theory and Practice of Coaching. Fundamentals, strategies, and psychology of coaching. Emphasis on basketball, and track and field. Additional topics such as safety and liability, gender equity, the media, regulations and ethics. One course. *Gaudet*

150. Health, Fitness and Wellness. Relationships among health, wellness, exercise, nutrition and fitness. Scientific evidence pertaining to diet and nutrition, weight control, cardiovascular and strength fitness, stress management, tension control, and drugs and alcohol. Development of a personal lifetime fitness program. One course. *LeBar*

170. History and Issues of Sports. Sports from ancient to modern times with an emphasis on sports in America. Not open to students who have taken this course as Health, Physical Education, and Recreation 49S. One course. *Buehler*

172. Administration in Sports Management. Philosophy, financial structure, administrative structure, fund-raising, NCAA legislation, personnel decision, and scheduling events. One course. *Alleva or Buehler*

COURSES CURRENTLY UNSCHEDULED

26. Scuba Diving

48. Men's Competitive Tennis

70. Folk Dancing

93. Orienteering

95. Wilderness Skills

110. Diet and Nutrition

112. Sexuality, Stress, and Substance Abuse: Choices, Risks, and Consequences

Health Policy Program

Assistant Professor Boychuk, *Director*

A certificate, but not a major, is available in this program.

The interdisciplinary Health Policy Certificate Program speaks to the needs of students preparing for careers in health care policy, management, and the associated professions as the American health care industry enters into a period of rapid and profound change.

Courses in the health policy certificate program address three interrelated goals: (1) to investigate the machinery of contemporary health policy-making and to understand the broad political dynamics which have conditioned American health policy, past and present; (2) to familiarize students with the institutional and economic complexity of the American health care system through the study of the interaction between the key players in health care financing and organization—employers, private insurance carriers, government regulators, health care providers, and consumers; and, (3) to explore the cultural and ideological underpinnings of modern conceptions of health and the recurrent ethical dilemmas facing health care providers, patients, and policymakers.

The program draws upon established research programs relating to health services centered in economics, political science, public policy, and sociology but recognizes the inspired contributions to health care debates originating in the disciplines of anthropology, history, law, medical arts, philosophy, psychology, and religion.

Program Requirements

The Health Policy Certificate is open to all undergraduates. Successful candidates must complete the prescribed combination of six courses: two prerequisite courses; two courses drawn from the core set of health policy course offerings; one elective course; and the capstone course, Public Policy 255S, Health Policy Analysis.

For further details, contact Professor Boychuk at the Center for Health Policy, Research, and Education, Room 125 Old Chemistry Building.

General Prerequisites

Economics 2D or 52D. Competition, Monopoly, and Welfare. *Staff*

Public Policy Studies 55D. Analytical Methods for Public Policy-Making. *Staff*

Background Courses

Cultural Anthropology 145. Medical Anthropology. *Staff*

History 189. Medicine in the West. *Green*

History 279, 280. Health, Healing, and History. *English*

Philosophy 118. Philosophical Issues in Medical Ethics. *Brandon or Golding*

Psychology 109. Health Psychology: Introduction and Survey. *Anderson or Gil*

Religion 159. Ethical Issues in Health Care. *McCullough*

Sociology 162. Health and Illness in Society. *Lin*

Methods Courses

Biometry 217. Medical Decision Analysis: What Does Clinical Research Have to Do with Clinical Practice? *Matchar*

*Economics 156. The Economics of Health Care. Prerequisite: Economics 2D or 52D. *Sloan*

Economics 215S. Applied Cost Benefit Analysis. Prerequisite: Economics 149. *Staff*

*Public Policy Studies 253. The Politics of Health Care. (Not available to undergraduates who have taken Public Policy Studies 157S.) *Sprinkle*

Public Policy Studies 256. The Economics of Health Care. Prerequisite: Economics 2D or 52D or 149 or Public Policy Studies 110. (Not available to undergraduates who have taken Public Policy Studies 157S.) *Sprinkle*

Public Policy Studies 261. Evaluation of Public Expenditures. (C-L: Economics 285.) *Staff*

Applications Courses

Food-and-Hunger Courses

One of the following may be counted:

Political Science 176A. (C-L: Interdisciplinary Course 120A.) Perspectives on Food and Hunger.

Johns

Political Science 176B. (C-L: Interdisciplinary Course 120B.) Perspectives on Food and Hunger.

Johns

Law 337. Health Care Law and Policy. (Open to limited undergraduate enrollment with consent of instructor.) *Havighurst*

*Public Policy Studies 157S. Health Policy. (May not be counted as a core course by students who have taken Public Policy Studies 253: The Politics of Health Care.) *Henderson-James*

Public Policy Studies 158S. Health Policy Summer Internship. (Must be preceded by Public Policy Studies 157S; does not count as a full course.)

Public Policy Studies 251S.01. Regulation of Vice and Substance Abuse. *Cook*

*Public Policy Studies 264S.07. Rationing Medical Care. Prerequisite: Economics 52D or 149 or Public Policy Studies 110. (May not be counted as a core course by undergraduates who have taken Economics 156.) *Lipscomb*

Public Policy Studies 264S.53. Science and Technology Policy. *Sprinkle*

Sociology 123. Social Aspects of Mental Illness. *Reed*

Sociology 163. Aging and Health. *Gold*

*Sociology 171. Comparative Health Care Systems. (Alternate years beginning fall 1993. May not be counted toward certificate if Sociology 227C is counted.) *Maddox*

Sociology 227C. Organization and Financing of Health Care. (Alternate years beginning fall 1992. May not be counted toward certificate if Sociology 171 is counted.) *Maddox*

Integrative Course

Public Policy Studies 255. Health Policy Analysis. (A group project for undergraduates only.) *CHPRE faculty*

Hebrew

For courses in Hebrew, see Asian and African Languages and Literature.

Hindi-Urdu

For courses in Hindi-Urdu, see Asian and African Languages and Literature.

History (HST)

Professor Chafe, *Chair*; Associate Professor Ewald, *Director of Undergraduate Studies*; Professors Cell, Davis, Dirlik, Durden, Gaspar, Gavins, Goodwyn, Gordon, Herrup, Hewitt, Keyssar, Kuniholm, Lerner, Mauskopf, M. Miller, Reddy, Richards, Roland, Shatzmiller, TePaske, Thompson, Witt, Wood, and Wright; Associate Professors English, Green, James, Koonz, Nathans, Neuschel, and Robisheaux; Assistant Professors French, Hachohen, Humphreys, Mazumdar, Peyroux, J. Scott, and Thorne; Professors Emeriti Cahow, Colton, Ferguson, Franklin, Holley, Parker, Preston, Ropp, A. Scott, W. Scott, Watson, and Young; Adjunct Professor Roberts; Adjunct Associate Professors Pelech and Wilson; Adjunct Assistant Professors Litle and Y. Miller; Visiting Professor Mendelsohn; Lecturer Biddle; Adjunct Lecturer Steen

A major is available in this department.

History courses offer students from all disciplines within the university an opportunity to investigate the past, gain perspective on the present, and improve their critical faculties. History provides an integrating principle for the entire learning process, and students of history gain a sense of human development, an understanding of fundamental and lasting social processes, and a feeling for human

interrelatedness. History courses train the mind by improving skills in communicating thought and imagination.

INTRODUCTORY COURSES

Students may benefit from taking at least one introductory course before proceeding to advanced-level courses. Majors take two introductory courses in history (21, 22; 21D, 22D; 21S, 22S; 53, 54; 75, 76; 91, 92; 91D, 92D; 91S, 92S or 93S); History 94 and 98 may not be used to fulfill the introductory course requirement. Additional courses may be chosen from this group as electives or part of the departmental major.

20S. Studies in Special Topics. (CZ) Opportunities for freshmen to engage with a specific historical issue, with emphasis on student writing. Topics vary each semester offered. One course. *Staff*

21. Europe to the Eighteenth Century. (CZ) Development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. One course. *Staff*

21D. Europe to the Eighteenth Century. (CZ) A lecture-discussion version of History 21. One course. *Staff*

21S. Europe to the Eighteenth Century. (CZ) A seminar version of History 21. One course. *Staff*

22. Europe from the Eighteenth Century. (CZ) Development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. One course. *Staff*

22D. Europe from the Eighteenth Century. (CZ) A lecture-discussion version of History 22. One course. *Staff*

22S. Europe from the Eighteenth Century. (CZ) A seminar version of History 22. One course. *Staff*

29. Comparative Revolutions: France, 1789—Russia, 1917. (CZ) An introductory investigation into the general significance of political revolutions in the modern Western world. Focuses on two classic case studies: the French and Russian revolutions. Compares origins, development, and consequences of these influential historical transformations. Secondary comparisons with the American Revolution. One course. *M. Miller*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

53. Greek History. (CZ) See C-L: Classical Studies 53. One course. *Oates*

54. Roman History. (CZ) See C-L: Classical Studies 54. One course. *Boatwright or Oates*

55. History, Ideas, and Material Life. (CZ) The intellectual and religious life of the fourteenth century presented within the context of the economic, political, and social framework of this period of plague, demographic depression, and economic contraction. Open only to students in the FOCUS Program Medieval and Renaissance Studies. One course. *Witt*

75, 76. The Third World and the West. (CZ) Economic, social, political, and cultural relationships, 1500 to the present. C-L: Comparative Area Studies. One course each. *Staff*

91. The Development of American Democracy to 1865. (CZ) The trends vital to an understanding of the United States today. The development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. One course. *Staff*

91D. The Development of American Democracy to 1865. (CZ) A lecture-discussion version of History 91. One course. *Wilson*

91S. The Development of American Democracy to 1865. (CZ) Seminar version of History 91. One course. *Staff*

92. The Development of American Democracy, 1865 to the Present. (CZ) A continuation of History 91 with emphasis upon the emergence of contemporary problems in the United States. Students who have taken History 93S may not receive credit for History 92. One course. *Staff*

92D. The Development of American Democracy, 1865 to the Present. (CZ) A lecture-discussion version of History 92. One course. *Wilson*

92S. The Development of American Democracy, 1865 to the Present. (CZ) Seminar version of History 92. One course. *Staff*

93S. Modern American History. (CZ) Same as History 92, but emphasizing additional topics considered appropriate for the Twentieth-Century America Program (FOCUS). Open only to students in that program. One course. *Staff*

98. Introduction to Canada. (SS) Does not count for introductory course requirements. See C-L: Interdisciplinary Course 98; also C-L: Canadian Studies, Comparative Area Studies, Economics 98, Political Science 98, and Sociology 98. One course. *LeClerc or Thompson*

COURSES TAUGHT IN DUKE STUDY ABROAD PROGRAMS

Courses numbered 100 with a letter suffix (100A, 100B . . . 100Z) are lecture courses taught in Duke-administered study-abroad programs, for example, in Germany, Italy, France, China. These courses provide the same credit and fulfill the same curriculum requirements as any 100-level lecture course in the history department.

100A. History of Modern Spain. (CZ) (Taught in fall program in Spain.) Not open to students who have taken History 101L. One course. *Staff*

100B. History of Renaissance Italy. (CZ) (Taught in Italy.) Not open to students who have taken History 182. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Witt or staff*

100C. Nineteenth-Century European Political History. (CZ) (Taught in France.) One course. *Staff*

100E. Indian History and the Present. (CZ) Overview of medieval and modern Indian history. Emphasis on the creation of a new Indian society emerging from the colonial past. (Taught in Delhi.) One course. *Kumar*

100F. European International Relations, 1859-1914. (CZ) (Taught in France.) One course. *Staff*

100G. Twentieth-Century Economic and Social History of France. (CZ) (Taught in France.) One course. *Staff*

100H. History of France, 1860-1944. (CZ) (Taught in France.) One course. *Staff*

100I. United States/Latin American Relations, 1889-1950. (CZ) (Taught in France.) One course. *Staff*

100J. Foundations of Chinese Civilization. (CZ) (Taught in China.) Not open to students who have taken History 163. See C-L: Cultural Anthropology 163; also C-L: Comparative Area Studies. One course. *Staff*

100K. History of Spain from Late Medieval Times to the Present. (CZ) (Taught in Spain.) Not open to students who have taken History 173. One course. *Staff*

100L. German History from 1870 to 1970. (CZ, FL) Analysis of the major historical, social, economic, and cultural developments of German history, from the founding of the German Reich through the post-World War II period. (Taught in Germany by a faculty member of the Free University of Berlin.) Not open to students who have taken History 188. C-L: Comparative Area Studies. One course. *Staff*

100N. History of Development and the Environment: Australia and California. (CZ) (Taught in Australia). One course. *Tyrell*

100Q. The United States in Twentieth-Century Japan. (CZ) Particular focus on the era of American occupation of Japan. (Taught in Japan.) One course. *Gordon*

100R. History of Austria. (CZ) Austrian history from 1800-1955 including the Habsburg Monarchy, the wars against Napoleon, Metternich, the democratic revolution in 1848, the roots of World War I, the Anschluss with Nazi Germany, World War II, the Allied occupation and events after the war. Taught in English. Offered only as part of the Duke in Vienna program. One course. *Staff*

100V. Actors and Policies in Contemporary Argentine Politics. (SS) (Taught in Argentina.) C-L: Comparative Area Studies. One course. *Torre*

100W. History of Spain I. (CZ) Through the seventeenth century. (Taught in Spain.) One course. *Maldonado*

100X. History of Spain II. (CZ) Eighteenth to the twentieth century. (Taught in Spain.) One course. *Maldonado*

100Y. S. Modern British History: The Political Economy of Decline (1880-1980). (SS) (Taught in Oxford.) Two courses. *Staff*

100Z. Perestroika in Nineteenth- and Twentieth-Century Russia. (CZ, FL) Focuses on the era from the fall of Kiev to the reign of Catherine the Great and the developments in nineteenth- and twentieth-century Russia. (Taught in Russian in St. Petersburg.) One course. *Staff*

UNDERGRADUATE COLLOQUIA

Colloquia are open without prerequisite to all undergraduates and are designed for the nonspecialist, although history majors may take them for credit. Each colloquium consists of reading and discussion involving an explicit historical theme. Short papers, reports, and a final examination may be required. Unlike seminars, which emphasize materials and methods of historical research, colloquia concentrate on historical literature.

101C. Terrorism, 1848-1968. (CZ) A comparative analysis of the origins and development of modern terrorism in the West (Europe, Russia, and the United States). C-L: Comparative Area Studies. One course. *M. Miller*

101G, 102G. Introduction to Islamic Civilization. (CZ) See C-L: Interdisciplinary Course 162, 163; also C-L: Comparative Area Studies; Cultural Anthropology 147, 148; Medieval and Renaissance Studies; and Religion 162, 163. One course each. *Cornell, Lawrence, and staff*

101K. Topics in Chinese Civilization. (CZ) C-L: Comparative Area Studies. One course. *Dirlik*

101M. Asian-Pacific Region in Historical Perspective. (CZ) The emergence of the Asian-Pacific region as a recognizable structure from the nineteenth century onward.

Premodern history will be dealt with only to the extent that it is necessary for understanding later developments. The role played by the flow of commodities, people, ideas, and other cultural artifacts. C-L: Comparative Area Studies. One course. *Dirlik*

101N. The Social History of Alcohol. (CZ) The history of the consumption of alcoholic beverages as an aspect of the social history of Western Europe and the United States. One course. *Roberts*

COURSES ON SPECIAL TOPICS

Lecture Courses

Courses numbered 103 or 104 with a letter suffix (103A, 104A; 103B, 104B . . . 103Z, 104Z) are lecture courses on special topics, concerning subject matter which the department does not endeavor to cover on a routine basis. Some will be offered only once and therefore will not appear in the bulletin. If such a course is likely to be offered more than once, it will be listed in the bulletin.

103A. Industrialization Versus Democracy in America, 1875-1975. (CZ) The social and urban consequences of industrialization in America as the nation moved from an agrarian to an urban society and entered the modern era of mass communication. Passage of the family farm, creation of an industrial working class, centralization of commerce and of political structures, and the interaction of these processes to produce political insurgencies and cultural conflicts. The effect of the tensions upon the democratic inheritance. One course. *Goodwyn*

103C. History of Books and Printing. (CZ) Origins and history of the leaf book and the subsequent development and spread of printing. Bibliographical and technical developments within the cultural context. One course. *Sharpe*

104B. A Survey of Latin American History through Film. (CZ) From the colonial period to the present. C-L: Comparative Area Studies and Film and Video. One course. *TePaske*

Seminar Courses

105S, 106S. Seminars in Selected Topics. One course each. *Staff*

UNDERGRADUATE INTERMEDIATE-LEVEL COURSES

107A, 107B. History of England. (CZ) English history from 1500 to the present in an effort to arrive at a synthesis of ideas, social conditions, and political events. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course each. *Staff*

108C. Canadian-American Relations. (CZ) The Canadian-United States relationship in its diplomatic, military, economic, and cultural aspects from the American Revolution to the present, with emphasis on the twentieth century. C-L: Canadian Studies and Comparative Area Studies. One course. *Thompson*

108D. Across the Great Divides: The United States and Canadian Wests in the Nineteenth and Twentieth Centuries. (CZ) An examination of the United States and Canadian westward movements, considering in comparative contexts: the dispossession of Native Peoples; federal government expansionist policies; the ranching, farming, and resource-extracting frontiers; immigration and ethnic diversity; women's experiences of the West; the transition of territories to states and provinces; political insurgencies. C-L: Canadian Studies. One course. *Thompson*

108E, S. The Canadian Health Care System. (SS) See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology

185S, Economics 185S, Political Science 185S, Public Policy Studies 187S, and Sociology 185S. One course. *Boychuck or LeClerc*

109. Contemporary Global Issues. (SS) See C-L: Comparative Area Studies 109; also C-L: Cultural Anthropology 109, Political Science 160, and Sociology 175. One course. *Staff*

110. History of Eastern Europe in Modern Times. (CZ) The development of the nations and nationalities of Eastern Europe since the early eighteenth century. C-L: Comparative Area Studies. One course. *Lerner*

111A. Early America to 1760. (CZ) Pre-Columbian explorations, European invasion of North America, the evolution of race slavery, and the responses of the native American peoples. Not open to students who have taken the former History 111. One course. *Wood*

111B. Era of the American Revolution, 1760-1815. (CZ) Origins, evolution, and consequences. Attention to economic, social, and geographical questions, as well as military and political. Not open to students who have taken the former History 112. One course. *J. Scott or Wood*

111C. The United States from the 1890s to 1940. (SS) Economic, social, and political history of the United States from the Populist revolt to the end of the New Deal. Not open to students who have taken the former History 113. One course. *Keyssar*

112A, 112B. The World in the Twentieth Century. (CZ) Imperialism and decolonization, war, revolution, international capitalism and depression, science and technology. 112A: 1900 to 1945; 112B: 1945 to present. One course each. *Cell*

113B. Europe's Colonial Encounter, 1492-1992. (CZ) Surveys the impact of colonial expansion on European economic development, political culture, and popular identity from the "age of discovery" through the present. One course. *Thorne*

114B. Immigration, Migration, and Mobility of Labor: United States and the World. (CZ) The major themes of migration, its impact on the country of departure as well as of destination, factors shaping the paths of migration, the relative openness and receptivity of countries to immigrants. Within a global framework, focus on migration and immigration to the United States, from the Irish in the 1840s to Hispanic migrants of recent decades. Case studies of migration to Latin America, migration from southern to northern Europe, and migratory movements within Asia, revealing similarities and differences in migration patterns that take place in diverse cultures and at different historical epochs. One course. *Keyssar*

115. History of Africa. (CZ) Social, political, and economic development in sub-Saharan Africa from 1400 to the present. C-L: African and Afro-American Studies 115, Comparative Area Studies, and Women's Studies. One course. *Ewald*

116. Aspects of Medieval Culture. (CZ) See C-L: Medieval and Renaissance Studies 114; also C-L: Classical Studies 139. One course. *Aers, Solterer, or Witt*

117. Early Modern Europe. (CZ) The economic, social, and political history of early modern Europe. C-L: Comparative Area Studies, Medieval and Renaissance Studies, and Women's Studies. One course. *Neuschel*

118A. American National Security Policy from 1945 to 1975. (CZ) Evolution of American defense policy, nuclear and conventional, within the political context of the Cold War. Not open to students who have taken the former History 157, American National Security Policy from 1945 to 1975. One course. *Biddle*

118B. Warfare in the Twentieth Century. (CZ) Key conflicts of this century evaluated in terms of causes and consequences (political, social, and economic), and strategy and technology (war plans, weapons systems, and doctrine). One course. *Biddle*

118C. History of the World Wars. (CZ) An examination of the origins, course, and consequences of the world wars of this century. One course. *Biddle*

119A, 119B. Native American History. (CZ) A survey of conditions and events from precolonial times to the present. One course each. *Wood*

120. History of Socialism and Communism. (CZ) The origins and development of socialist and communist movements from pre-Marxian times to the present. Not open to students who have taken History 239. C-L: Comparative Area Studies. One course. *Lerner*

121A. America in International Affairs, 1607-1861. (CZ) The diplomacy of the colonial, revolutionary, and early national periods. One course. *Staff*

121B. The United States as a World Power: 1861-1941. (CZ) American diplomacy from the beginning of the Civil War to entry into World War II. One course. *Staff*

121C. American Diplomacy since 1941. (CZ) Not open to students who have taken the former History 122, American Diplomacy. One course. *Staff*

123S. Madness and Society in Historical Perspective. (SS) Mental illness and psychiatric treatment from antiquity to the present with special concentration on the nineteenth and twentieth centuries in Europe, America, and Russia. C-L: Comparative Area Studies. One course. *M. Miller*

124S. Slave Society in Colonial Anglo-America: The West Indies, South Carolina, and Virginia. (CZ) The development of slave-based societies and the production of staple crops for export. C-L: African and Afro-American Studies 124S and Comparative Area Studies. One course. *Gaspar*

126S. Women in the Ancient World. (CZ) See C-L: Classical Studies 104S; also C-L: Women's Studies. One course. *Boatwright*

127A. The Caribbean, 1492-1700. (CZ) The Caribbean region from the arrival of Columbus (1492) to the emergence of sugar and slavery as powerful shapers of society and culture, by 1700. C-L: African and Afro-American Studies 127A. One course. *Gaspar*

127B. The Caribbean in the Eighteenth Century. (CZ) The development of Caribbean society and economy in the contexts of slavery, empire, international rivalry, and democratic revolution. Not open to students who have taken History 127. C-L: African and Afro-American Studies 127B. One course. *Gaspar*

129A. Experiment in Republicanism: The United States, 1787-1860. (CZ) Not open to students who have taken the former History 129. One course. *Nathans*

129B. From Victorian to Corporate America, 1820-1900. (CZ) Not open to students who have taken History 130. One course. *Nathans*

130A. Modern Ireland. (CZ) A comparison of Irish history with British imperial history. Survey of Irish history from the Elizabethan conquest to the present. One course. *Cell*

131A. History of Mexico and the Caribbean in the Nineteenth and Twentieth Centuries. (CZ) Not open to students who have taken History 131. C-L: Comparative Area Studies. One course. *TePaske*

131B. The Spanish Caribbean. (CZ) Cuba, the Dominican Republic, and Puerto Rico from the encounter in 1492 to the present with special emphasis on the early days of colonization, intercolonial rivalry, comparative economic and social developments, and the Cuban revolution. C-L: Comparative Area Studies. One course. *TePaske*

132. Modern World Environmental History, 1500 to the Present. (CZ) Environmental effect of global economic growth. Impacts of agriculture, forestry, mining, and industry on the biosphere. Use of freshwater resources. Effects of modern transportation and urbanization. The world environmental movement. C-L: Comparative Area Studies. One course. *Richards*

133A. Medieval Europe, 300-900. (CZ) Not open to students who have taken History 133. C-L: Medieval and Renaissance Studies. One course. *Staff*

133B. Medieval Europe, 1000-1450. (CZ) Not open to students who have taken History 133. C-L: Medieval and Renaissance Studies. One course. *Peyroux or Shatzmiller*

133C. Medieval England. (CZ) From the fifth through the fourteenth centuries. Not open to students who have taken History 134. C-L: Medieval and Renaissance Studies. One course. *Staff*

134A. History of Jews in the Middle Ages. (CZ) One course. *Shatzmiller*

135B. Germany from 1871 to 1933. (CZ) Militarism, socialism, and feminism following the first unification; Weimar democracy in the aftermath of defeat; the popularity of Hitler in the context of the Depression. C-L: Comparative Area Studies. One course. *Koonz*

135C. Germany from 1933 to 1990. (CZ) The creation of the Nazi state, its propaganda, economic recovery schemes, and bio-political social organization. The war years, from the standpoint of the victims and perpetrators, to be examined through memoirs and psychological studies of the "holocaust kingdom." The postwar period: women's role in rebuilding Germany, de-Nazification and the Cold War in the East and West, and (based on journalists' accounts) "post-wall" Germany. The shape of public memory in "Bitburg history" and monuments to the victims of Nazi extermination. One course. *Koonz*

136. Introduction to Contemporary Latin American Reality. (CZ) The complexity and diversity of factors which help to define the daily experience of Latin American reality for contemporary Latin Americans. Through cultural, academic, and government documents, issues ranging from ecology and energy policy in Brazil to human rights abuses and the experience of women in modern Latin America will be studied. One course. *James*

137. Comparative Approaches to Global Issues. (SS) See C-L: Comparative Area Studies 125; also C-L: Cultural Anthropology 125, Political Science 125, Religion 121, and Sociology 125. One course. *Staff*

138. Renaissance and Reformation Germany. (CZ) The interplay of social, economic, and political developments in Central Europe from the eve of the Reformation to the end of the Thirty Years' War, with particular attention to the links between religion, gender, and the social order. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Robisheaux*

139A. Radical Movements in Modern Asia. (CZ) The emergence, interactions, and the nature of radical movements in Asian societies. Emphasis on identifying the character of Asian radical discourses as expressions of third world responses to modernity. One course. *Dirlik*

140S. Economics of Slavery in the American South. (SS) Prerequisite: Economics 149. See C-L: Economics 161S; also C-L: African and Afro-American Studies 161S. One course. *Staff*

141S. American Light. (CZ) The stories, poems, and essays of Raymond Carver and the paintings of Edward Hopper as a means of thinking about the social history of America's twentieth-century working-class people. One course. *Coles*

142A. China: Roots of Revolution. (CZ) A survey of modern Chinese history with special emphasis on the nineteenth and twentieth centuries. Not open to students who have taken History 142. C-L: Comparative Area Studies. One course. *Dirlik or Mazumdar*

142B. China since 1949: The People's Republic. (CZ) The Chinese path to communism and the communist transformation of Chinese society. Not open to students who have taken History 139. C-L: Comparative Area Studies. One course. *Dirlik or Mazumdar*

142C. Chinese Food in History. (CZ) Food and food crops in historical perspective. Using literary sources and art, the course reconstructs the culture of food. One course. *Mazumdar*

143A. Ancient and Early Modern Japan. (CZ) Japan from earliest settlement to 1868; the Heian Court, rise of the samurai, feudal society and culture, the Tokugawa age, and the Meiji Restoration. Not open to students who have taken the former History 143. C-L: Comparative Area Studies. One course. *Gordon*

143B. The Emergence of Modern Japan. (CZ) Japan from Meiji to microchips. The Meiji settlement, industrialization and urban growth; political parties, social movements, and foreign policy in the imperial era; World War II and the American occupation; economic recovery. Not open to students who have taken the former History 144. C-L: Comparative Area Studies. One course. *Gordon*

145A, 145B. Afro-American History. (CZ) The black experience in America from slavery to the present. C-L: African and Afro-American Studies 145A, 145B and Comparative Area Studies. One course each. *Gavins*

146. Introduction to Russian Civilization. (CZ) See C-L: Russian 190; also C-L: Comparative Area Studies. One course. *Pelech*

147A. The Jews in Eastern Europe. (CZ) Jewish social, cultural, and political history in the lands of Eastern Europe (Russia, Poland, Romania, Hungary, Czechoslovakia) in the nineteenth and twentieth centuries. Emphasis on relations between Jews and non-Jews and on the Jewish efforts to solve the "Jewish question." Special attention to Poland and the Soviet Union in the interwar period. One course. *Mendelsohn*

148. Aspects of Renaissance Culture. (CZ) See C-L: Medieval and Renaissance Studies 115; also C-L: Art 149. One course. *Rasmussen, Van Miegroet, and Witt*

149. World Military History. (CZ) Comparative study of war as a social institution in different times and cultures. Topics include the origins of war and war in ancient China, classical Greece, the Middle Ages, early modern Europe, colonial America, nineteenth-century Japan, the cold war, and Vietnam. One course. *Roland*

151A. The Intellectual Life of Europe, 1250-1600. (CZ) Not open to students who have taken History 104. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Witt*

151C. European Intellectual History, 1789-1848. (CZ) Contextual study of some major works in European social and political thought from the late Enlightenment and the French Revolution to the revolutions of 1848. Readings in Kant, Wollstonecraft,

Burke, de Staël, Constant, Hegel, Marx, and Tocqueville, as well as in secondary interpretations and historical works. One course. *Hacohen*

151E. European Intellectual History, 1848-1918. (CZ) Contextual study of some major works in European social and political thought from the revolution of 1848 to the First World War. Readings in Mill, Taylor, Marx, Nietzsche, Freud, Durkheim, Weber, Lenin, Kollantai, and Gramsci, as well as in secondary interpretations and historical works. One course. *Hacohen*

151F. European Intellectual History, 1918-1968. (CZ) Contextual study of some major works in European social and political thought from the First World War to the Student Revolution. Readings in Schmitt, Arendt, Heidegger, Beauvoir, Wittgenstein, Berlin, Fanon, Foucault, and Habermas. One course. *Hacohen*

152. The Modern Middle East. (CZ) The historical development of the Middle East in the nineteenth and twentieth centuries. The emergence of nation-states in the region following World War I. C-L: Comparative Area Studies. One course. *Y. Miller*

153. The Insurgent South. (CZ) One course. *Goodwyn*

154A. Society and the State in France, 1700 to the Present. (CZ) Examines French social history in relation to the growth of the state from the old regime to the present day. Attention given to those turning points such as the revolutions of 1789 and 1848 or the cataclysm of World War I, in which society imposed a new shape on the state and, in turn, was transformed by it. Gender, the family, economic development, leisure, and literature. One course. *Reddy*

154D. The French Revolution at 200 Years. (CZ) The uncertainties that still surround historical interpretations of this seminal event. One course. *Reddy and Stewart*

155. Mexico From Pre-Columbian Times to the Present. (CZ) The rise of Native American civilizations, Spanish Conquest and colonization, Wars of Independence, and nineteenth-century political instability. Special attention to the Mexican Revolution and its impact on modern Mexico. One course. *Tepaske*

156A. The Reformation of the Sixteenth Century. (CZ) See C-L: Religion 167. One course. *Hillerbrand*

156B. History of the Christian Church. (CZ) See C-L: Religion 120. One course. *Hillerbrand*

157A. Rise of Modern Science: Early Science through Newton. (CZ) The development of science and medicine with attention to cultural and social influences upon science. Not open to students who have taken the former History 118. One course. *Mauskopf*

157B. Rise of Modern Science: Eighteenth to the Twentieth Century. (CZ) See History 157A. Not open to students who have taken the former History 118. One course. *Mauskopf*

157C. Rise of Modern Science: Twentieth Century. (CZ) See History 157A. Not open to students who have taken the former History 118. One course. *Mauskopf*

158A. New Perspectives on the Atlantic World. (CZ) Reorients the histories of four continents. An exploration of how an Atlantic world arose because of the interactions among Africa, North America, South America, and Europe. How this Atlantic world originated in the fifteenth century; how people emigrated, by force or free will, from one continent to another (and often back again); how plants, animals, trade goods, and diseases crossed the ocean; how ideas—especially revolutionary ideas—arose from intercontinental contact and spread throughout the Atlantic world. Concludes that

people of each of the Atlantic continents possess a heritage including the three other continents, and that this heritage was ocean-borne. One course. *Ewald*

159S. The Palestine Problem and United States Public Policy. (CZ) See C-L: Public Policy Studies 175S; also C-L: Comparative Area Studies. One course. *Kuniholm*

160. The United States from the New Deal to the Present. (CZ) C-L: Women's Studies. One course. *Chafe*

161. History of Modern Russia. (CZ) Following a brief introduction to the medieval origins of the Imperial Russian state, the course will concentrate on the period between the reign of Catherine the Great (1762-1796) and the death of Lenin in 1924. Emphasis on state authority, ruling elites, and the formation of the opposition revolutionary movement leading to the Bolshevik seizure of power in 1917. Not open to students who have taken both History 161A and 161B. C-L: Comparative Area Studies. One course. *M. Miller*

162A. Diplomatic Relations in the Western Hemisphere. (CZ) Relations between Latin America and the United States from 1815 through the 1960s with special emphasis on Mexico, Central America, and the Caribbean. The eras of Manifest Destiny, Dollar Diplomacy, the Cold War, and the Cuban Revolution as seen through the biography and discourse of participants and historians. One course. *French*

163A. The Coming of the United States' Civil War, 1820-1860. (CZ) Slavery and the gradual collapse of the early national consensus concerning it. The rise of sectionalism as reflected mainly in the nation's politics. One course. *Durden*

163B. The United States' Civil War and its Aftermath, 1861-1900. (CZ) Emphasis on the political and social aspects of the war; only slight treatment of battles. Political, racial, and economic themes of the Reconstruction and Populist eras. One course. *Durden*

163C. The American Civil War. (CZ) One course. *Goodwyn*

164. India, Pakistan, and Bangladesh: 1750 to the Present. (CZ) Social and economic impact of Western rule, development of nationalism and independence. C-L: Comparative Area Studies. One course. *Richards*

165. Working Class History in the United States. (CZ) A social history of the working class, as well as a political history of labor, from the early nineteenth century to the present. Not open to students who have taken History 106. One course. *Keyssar*

166S. American Dreams, American Realities. (CZ) The role of such myths as "rags to riches," "beacon to the world," the "frontier," and the "foreign devil" in defining the American character and determining the hopes, fears, dreams, and actions of people throughout American history. One course. *Wilson*

167S. United States and Canadian Constitutional Issues. (CZ) A comparative study of the development of federalism. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

168S. The Atlantic Slave Trade. (CZ) The development of the slave trade from the fifteenth century to its abolition in the nineteenth century; organization and mechanics, impact on Europe, Africa, and the Americas. C-L: African and Afro-American Studies 168S and Comparative Area Studies. One course. *Gaspar*

169A, 169B. The Social History of American Women. (CZ) C-L: Women's Studies. One course each. *Hewitt*

170C. Brazilian Race Relations in Comparative Perspective. (CZ) Slavery and the post-emancipation trajectory of Afro-Brazilians in a racist society which officially pro-

claims itself a "racial democracy." Comparisons will be drawn with the Afro-American experience elsewhere in Latin America and the United States. C-L: African and Afro-American Studies 170. One course. *French*

171A. History of Women in Early Modern Europe. (CZ) Women in Europe from medieval times to 1800 with attention to economic, social, and intellectual experience. C-L: Comparative Area Studies and Women's Studies. One course. *Neuschel*

171B. History of Women in Modern Europe. (CZ) History of women in Europe since 1700 with attention to economic, social, and intellectual experience. C-L: Comparative Area Studies and Women's Studies. One course. *Koonz*

172A. Comparative Perspectives on Women in Asia, Africa, and the Middle East. (CZ) One course. *Mazumdar*

173. History of Spain from Late Medieval Times to the Present. (CZ) Development of the Spanish nation-state from the times of Ferdinand and Isabella, Charles V, and Philip II to the Franco regime and its aftermath. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

174A. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. (CZ) The pre-Columbian cultures, European conquest and its effects on the Amerindian peoples, and development of the Spanish and Portuguese Empires to the wars of independence with special emphasis upon colonial institutions and socioeconomic developments. Not open to students who have taken History 174. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

174B. Modern Latin America. (CZ) A survey of nineteenth- and twentieth-century economic, social, and cultural change. Not open to students who have taken History 177. C-L: Comparative Area Studies. One course. *Staff*

175S. The Southern Plantation as Historical Laboratory: Odyssey in Black and White, 1770-1970. (CZ) Readings and discussion on the plantation as a microcosm of Southern social history since 1770, emphasizing the parallel evolution of black and white communities, families, economies, cultures, perceptions, and power struggles. C-L: African and Afro-American Studies 175S. One course. *Nathans*

177A, 177B. American Constitutional Development. (SS) May not be taken by students who have taken Political Science 118 and/or Political Science 143. See C-L: Political Science 177, 178. One course each. *Fish*

178A. Science and Technology in the Ancient World. (CZ) See C-L: Classical Studies 101. One course. *Rigsby*

179. History of South Africa, 1600-1960. (CZ) The relationships among South Africa's racial and cultural communities, with special attention to economic and political developments within each community and the impact of those developments on their mutual interactions. C-L: African and Afro-American Studies 179 and Comparative Area Studies. One course. *Ewald*

180. The Soviet Experience. (CZ) A survey of the history of Russia and the Soviet Union from the eve of the Revolution to the present day with particular emphasis on political, social, and cultural change and continuity. Not open to students who have had History 262. C-L: Comparative Area Studies. One course. *Lerner*

183S. Canada from the French Settlement. (CZ) Problems in the development of Canada and its provinces. C-L: Canadian Studies and Comparative Area Studies. One course. *Thompson*

184S. Canadian Issues. (SS) Prerequisite: Interdisciplinary Course 98 or consent of instructor. See C-L: Interdisciplinary Course 184S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 184S, Economics 184S, Political Science 184S, and Sociology 184S. One course. *Staff*

186. Marxism and Society. (SS) See C-L: Cultural Anthropology 139; also C-L: Comparative Area Studies, Education 139, Interdisciplinary Course 139, Literature 139, and Sociology 139. One course. *Staff*

187. History and Religions of North Africa. (CZ) See C-L: Religion 164; also C-L: African and Afro-American Studies 164, Comparative Area Studies, and Interdisciplinary Course 164. One course. *Cornell*

188A. Genocide in the Twentieth Century. (CZ) Focus on four cases in which soldiers have launched murderous attacks against civilians: Turks against Armenians, Nazis against Jews and other racial enemies, Khmer Rouge against their Cambodian enemies, and "ethnic cleansing" in Yugoslavia. Examines responsibility of both perpetrators and bystanders. One course. *Koonz*

189A. Medicine in the West. (CZ) Concepts of disease, the social context of the delivery of medical care, and the standing of physicians in society. The relation between medical theory and medical practice. Not open to students who have taken History 189. One course. *Green*

189B. History of Public Health in America. (CZ) The role of epidemic diseases such as smallpox, cholera, yellow fever, tuberculosis, and polio in shaping public health policy in the United States from the colonial era to World War II. One course. *Humphreys*

190. The History of Women in Science and Medicine. (CZ) The history of scientific and medical theories about women and an analysis of women as participants in the evolution of science and medicine. One course. *Green*

193, 194. Introduction to the Civilizations of Southern Asia. (CZ) See C-L: Interdisciplinary Course 101, 102; also C-L: Asian and African Languages and Literature 160, 161; Comparative Area Studies; Cultural Anthropology 101, 102; and Religion 160, 161. One course each. *Khanna or staff*

SMALL GROUP LEARNING EXPERIENCES

Independent Study

Independent study is usually undertaken by students concurrently with a course or with an instructor with whom they have had a course. Students should submit to the instructor in writing a detailed description of intent in the study. Both the instructor's consent and approval of the director of undergraduate studies are required for enrollment.

191, 192. Independent Study. One course each. *Staff*

Undergraduate Seminars

See also History 21S, 22S, 49S, 91S, 92S, 93S, 105S, 106S, 123S, 124S, 140S, 141S, 159S, 166S, 167S, 168S, 175S, 176S, 183S, 184S.

195S, 196S. Seminars for Undergraduates. Opportunities for historical investigation of significant problems. Juniors as well as seniors may apply for admission to these courses and are urged to do so if they expect to be candidates for graduation with distinction in history or if they expect to practice-teach in their senior year. Open to majors and nonmajors. The sections are listed below. One course each. *Staff*

Courses with an asterisk are offered for year-long study and carry two course credits. For these courses students may obtain the instructor's permission to enroll in only one semester and receive credit. Courses without an asterisk are one semester courses and carry one course credit each.

2. Reform, Protest, and Social Change in the Nineteenth-Century United States. (CZ) *Nathans*
- *3. Problems in the Social and Intellectual History of the United States. (CZ) *Staff*
- *4. Medicine and Society in America. (CZ) *English*
- *6. The Era of the American Civil War, 1820-1900. (CZ) *Staff*
7. Religion and Society in Modern British History. (CZ) *Thorne*
- *8. Modern Chinese Thought. (CZ) C-L: Comparative Area Studies. *Dirlik*
9. Issues in Early Modern Japanese Development. *Staff*
10. History of Jews in Eastern Europe in Modern Times. *Lerner*
11. Medieval Universities and Their Students. (CZ) *Shatzmiller*
13. Problems in Early Modern English History. (CZ) C-L: Comparative Area Studies and Medieval and Renaissance Studies. *Herrup*
14. Social Movements in the American South, 1865-1970. (CZ) *Goodwyn*
15. Society and Polity in France, 1700 to the Present. (SS) C-L: Comparative Area Studies. *Reddy*
16. Science and Society. (CZ) *Mauskopf*
- *17. Problems in the History of Modern Japan. (CZ) C-L: Comparative Area Studies. *Gordon*
18. The Destruction and Aftermath of Slavery in the Americas: A Comparative Perspective. (CZ) C-L: African and Afro-American Studies 197S and Comparative Area Studies. *J. Scott*
19. Social Conflict and Political Change in the United States, 1789-1860. (SS) *Nathans*
20. The Asian-American Experience. (SS) *Dirlik*
21. Problems in Indian History. C-L: Comparative Area Studies. (SS) *Richards*
- *22. Problems in Latin American History. (SS) C-L: Comparative Area Studies. *TePaske*
23. Issues in the History of Tropical Africa. (SS) C-L: African and Afro-American Studies 196S and Comparative Area Studies. *Ewald*
- *24. Problems in Recent United States Diplomatic History. (CZ) *Staff*
25. Problems in Twentieth-Century American History. (SS) *Chafe*
26. State and Society in the Third Reich. (CZ) *Koonz*
27. Origins of the Cold War. (SS) *Kuniholm*
28. The Spanish Civil War and Its Aftermath. (CZ) *TePaske*
29. Proletarians and Peasants, Bandits and Prophets: Social Movements in Nineteenth- and Twentieth-Century Latin America. (CZ) *James*
30. Problems in Russian History. (CZ) C-L: Comparative Area Studies. *M. Miller*
31. History and Memory of Nazi Genocide. (CZ) *Koonz*
32. Crime and Society: Changing Definitions of Criminality in England and America. (SS) *Herrup*
33. Political Participation in the United States. (SS) *Keyssar*
34. Problems in Imperialism. (CZ) *Cell*
35. Palestine and the Arab-Israeli Conflict. (CZ) C-L: Comparative Area Studies. *Y. Miller*
36. Women, Family, and State. (CZ) C-L: Comparative Area Studies and Women's Studies. *Y. Miller*
37. Before Columbus: Western Views of the Non-Western World. (CZ) *Green*
38. The Costs of Industrialization. (CZ) *Goodwyn*
39. The Soviet Experience. (CZ) Not open to students who have taken History 180. *Lerner*
40. Fugitive Slave (Maroon) Communities in New World Slave Societies. (CZ) C-L: African and Afro-American Studies 195S and Comparative Area Studies. *Gaspar*
41. Women in Medieval Society. (CZ) C-L: Women's Studies. *Green*
- *43. The Transition from Rural to Urban Society. (CZ) *A. Scott*
44. Popular Patriotism in Modern British History. (CZ) *Thorne*
45. Canadian and American Agrarian Movements. (SS) C-L: Canadian Studies. *Thompson*
46. Chinese and Chinese-American Women. (CZ) *Mazumdar*
47. The Medieval City. (CA) *Shatzmiller*
48. History of Witchcraft and Magic: Antiquity to 1700; 1700 to Present. (CZ) *Robisheaux*
49. Latin American Oral History. (CZ) *James*
50. The Women's Movement in the United States. (CZ) C-L: Women's Studies. *Hewitt*
51. Modern Chinese Thought. (CZ) *Dirlik*
52. Issues in Medieval History. (CZ) *Staff*
54. Community Service and Documentary Tradition. (CZ) C-L: Public Policy Studies 195S.27. *Coles and Harris*
57. Middle East Conflict and United States Policy. (CZ) *Kuniholm*
59. History of Zionism and the State of Israel. (CZ) *Y. Miller*
65. Women in Latin America. (CZ) *French*
66. Sex, Race, and Class in America. (CZ) *Hewitt*
70. Culture and Politics of International Exile Communities. (CZ) C-L: Comparative Area Studies. *Miller*

72. *Islam in West Africa in the Middle Ages.* (CZ) C-L: African and Afro-American Studies 196S. *El Hamel*
74. *Land of the South: An Ecological Approach.* (CZ) *Rosengarten*
75. *The Computer Revolution.* (CZ) *Roland*
78. *The Segregated South: Race Relations in the Twentieth-Century American South.* *Valk*
80. *Society and the Holy in the Middle Ages.* (CZ) *Peyroux*
81. *Chinese Diaspora.* (CZ) *Mazumdar*
82. *Afro-Brazilian History.* (CZ) C-L: African and Afro-American Studies 199 and Comparative Area Studies. *French*

Honors Seminars

197S-198S. Senior Honors Seminar. Designed to introduce qualified students to advanced methods of historical research and writing and to the appraisal of critical historical issues. Open only to seniors, but not restricted to candidates for graduation with distinction. This course, when taken by a history major, is accompanied by either a year-long 195S-196S seminar or two courses at the 200 level. In unusual circumstances, with consent of the instructor, coordinator of the senior honors seminar, and director of undergraduate studies, 191-192 may replace the two courses of 195S-196S seminars or the two courses at the 200 level. Two courses. *Staff*

ADVANCED COURSES (FOR SENIORS AND GRADUATES)

Students may receive credit for either semester of a hyphenated course at the 200 level without taking the other semester if they obtain written consent from the instructor.

201S. The Russian Intelligentsia and the Origins of the Revolution. (CZ) Origin and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of the labor movement. C-L: Comparative Area Studies. One course. *M. Miller*

202S. The Russian Revolution. (CZ) An analysis of the Bolshevik seizure of power in 1917 and the establishment of a revolutionary society and state during the 1920s. C-L: Comparative Area Studies. One course. *M. Miller*

203. Topics in Modern World Environmental History. (CZ) Human effects upon the natural environment; case studies and a synthetic global perspective. One course. *Richards*

206. Origins of Afro-America. (CZ) A comparative and interdisciplinary approach to early history of Africans in the Western hemisphere. Uses anthropological, linguistic, and archeological literature in addition to historical studies to examine the origins of the diverse African-American cultures of the Americas. C-L: African and Afro-American Studies 206. One course. *J. Scott*

209S. Race, Class, and Gender in Modern British History. (CZ) The intersection between gender, race, and class identities in British history since the eighteenth century. The parallels and overlaps as well as the disjunctures and distinctions between these different modes of power in a period of tremendous economic, social, and political change resulting from industrialization and imperial expansion. Questions and issues include the impact of industrialization on gender as well as class consciousness, the role of women, the middle classes and the working classes in the campaign against slavery, British workers' reactions to the "scramble" for colonies, the attitudes and activities of British women in the empire, and sexuality and the evolution of racist discourse. One course. *Thorne*

210S. Anthropology and History. (SS) Prerequisite: major in history, one of the social sciences, or comparative area studies; or graduate standing. See C-L: Cultural Anthropology 207S. One course. *Reddy*

211A. History of Medicine in the Southern United States. (CZ) The social history of disease and medical practice in the southern United States from the colonial era to World War II. Topics will include the impact of disease on the region's settlement and economy, slave health, the role of "alternate practitioners," and the growing federal presence in the post-Reconstruction South. One course. *Humphreys*

213S. Early Modern France. (CZ) Intensive survey of French history from approximately 1500-1750, including political, social, religious, and economic history. Focuses on interpretive trends in historiography and links between cultural history and literature. One course. *Neuschel*

214. Class, Public Opinion, and the French Revolution. (CZ) The current state of the ongoing controversies over the origins and character of the first modern social revolution. One course. *Reddy*

216S. United States Diplomacy, 1890-1945. (CZ) C-L: Canadian Studies. One course. *Staff*

217. Problems in American Colonial History. (CZ) One course. *J. Scott*

219S, 220S. History of Science and Technology. (CZ) The interaction of science and technology in the Western world from earliest times to the present. One course each. *Mauskopf and Roland*

221. Topics in the Social and Economic History of Europe, 1200-1700. (CZ) C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Staff*

222. Problems in the Intellectual History of the European Renaissance and Reformation. (CZ) Prerequisites: History 151A, 151B and reading knowledge of German, French, or Italian. C-L: Medieval and Renaissance Studies. One course. *Witt*

223S, 224S. The World Wars. (CZ) The causes, course, and consequences of World Wars I and II, from military, political, and economic perspectives; the legacy of World War II; special emphasis on understanding the experience of total war—not only for the individual soldier but for whole societies. One course each. *Biddle*

225S. Problems in Comparative Labor History. (SS) Common dilemmas and varying solutions in the cross-national development of labor-management relations, their political implications, and their larger historical significance. One course. *French, Gordon, or Keyssar*

226. Topics in the Labor History of the United States. (SS) One course. *Keyssar*

230S. Populism in Latin America. (CZ) An examination of the various theoretical frameworks developed for Latin American populism, followed by case studies focusing on issues such as the emergence of a modernizing state, the role of the masses in populist movements, and the class content and ideological and cultural parameters of such movements. One course. *James*

233S. Slave Resistance and Social Control in New World Societies. (CZ) The operation of slave societies in the Americas from the sixteenth to the nineteenth centuries focusing on master-slave relations and slave resistance. C-L: African and Afro-American Studies 233S and Comparative Area Studies. One course. *Gaspar*

234S. Political Economy of Development: Theories of Change in the Third World. (SS) See C-L: Political Science 234S; also C-L: Comparative Area Studies, Cultural Anthropology 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Staff*

235S. The Antebellum South. (CZ) The economic, political, and social aspects of life in the South, 1820-1860. One course. *S. Nathans*

237S. Europe in the Early Middle Ages. (CZ) C-L: Medieval and Renaissance Studies. One course. *Staff*

238S. Europe in the High Middle Ages. (CZ) C-L: Medieval and Renaissance Studies. One course. *Staff*

239. History of Socialism and Communism. (CZ) The origins and development of socialist and communist movements from pre-Marxian times to the present. Not open to students who have taken History 120. C-L: Comparative Area Studies. One course. *Lerner*

240A. Multinationalism and Multiculturalism: Eastern Europe Example. (CZ) One course. *Lerner*

241A. Origins of Totalitarianism. (CZ) One course. *Hacohen*

247. Mughal India. (CZ) C-L: Comparative Area Studies. One course. *Richards*

248. History of Modern India and Pakistan, 1857 to the Present. (CZ) C-L: Comparative Area Studies. One course. *Richards*

251A. Topics in Intellectual History of Europe, 1250-1450. (CZ) C-L: Medieval and Renaissance Studies. One course. *Witt*

251B. Topics in Intellectual History of Europe, 1450-1650. (CZ) C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Witt*

252A. Construction of China in European and American Literature. (CZ) An examination, starting with Marco Polo's account of China, of representations of China in Euro-American writing toward an understanding of a Euro-American discourse on China. Emphasis on fiction, but consideration as well of the relationship between fictional and nonfictional writing (especially history, geography, and travelogue). While the approach is historical, contemporary representations of China are of primary concern. Not open to students who have taken History 252. One course. *Dirlik*

252B. Culture and Society in Contemporary China. (CZ) Developments in Chinese society and culture since 1978, focusing on social changes in China and on matters of culture. Culture here includes debates on culture and history, as well as various forms of cultural production (literature, film, and popular culture). Parallel developments in Pacific Asia (Japan, Taiwan, and Hong Kong, in particular). One course. *Dirlik*

253S, 254S. European Diplomatic History, 1871-1945. (CZ) Origins of the First and Second World Wars, the diplomacy of the wars, and the peace settlements which followed them. 253S: 1871-1918; 254S: 1919-1945. C-L: Comparative Area Studies. One course each. *Staff*

255A, S. Development of United States Courts of the Fourth Circuit. (SS) Consent of instructor required. See C-L: Political Science 238S; also C-L: Law 486S. One course. *Fish*

256. Modern Literature and History. (AL) See C-L: French 256. One course. *Orr*

257. Comparative Latin America Labor. (CZ) An interdisciplinary examination of the monographic literature on Latin-American labor in the twentieth century. One course. *French*

258S. Social Conflict in Weimar and Nazi Germany. (CZ) The interactions between emancipation and backlash; military defeat and patriotism; political equality and biopolitics; dissent and repression; and among propaganda, bureaucratic chaos, and police terror. C-L: Comparative Area Studies. One course. *Koonz*

260. Fifth and Fourth Century Greece. (CZ) See C-L: Classical Studies 222. One course. *Oates or Riggsby*

262. The Soviet Experience. (CZ) A survey of the history of Russia and the Soviet Union from the eve of the Revolution to the present day with particular emphasis on political, social, and cultural change and continuity. Not open to students who have had History 180. C-L: Comparative Area Studies. One course. *Lerner*

263. The Roman Republic. (CZ) See C-L: Classical Studies 224. One course. *Boatwright or Riggsby*

264. The Roman Empire. (CZ) See C-L: Classical Studies 225. One course. *Boatwright*

265S. Problems in Modern Latin American History. (SS) C-L: Comparative Area Studies. One course. *Staff*

267S. England in the Sixteenth Century. (CZ) C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Herrup*

268S. England in the Seventeenth Century. (CZ) C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Herrup*

271S. The Law of War. (CZ) The evolution of constraints on warfare in the Western world, both codified and customary. The concept of the "just war" as well as restrictions on the conduct of combat (ground, naval, and aerial) as they have evolved over time. One course. *Biddle*

272S. Fin-de-siècle and Interwar Vienna: Politics, Society, and Culture. (CZ) Advanced undergraduate seminar in intellectual history focusing on the cultural milieu of *fin-de-siècle* and interwar Vienna. One course. *Hacohen*

273S, 274S. Topics in the History of Science. (CZ) Critical stages in the evolution of scientific thought. One course each. *Mauskopf*

275S. Asian and Asian-American Women in Comparative Perspective. (CZ) A woman-centered approach to the history of colonialism and nationalist struggles in Asia, the evolution of racialist discourse and its impact on Asian immigration to the United States. One course. *Mazumdar*

277S. The Coming of the Civil War in the United States, 1820-1861. (CZ) One course. *Durden*

278S. The Civil War in the United States and Its Aftermath, 1861-1900. (CZ) One course. *Durden*

279, 280. Health, Healing, and History. (CZ) The development of medicine within the broader cultural context from prehistory to the twentieth century. One course each. *English*

281S. United States' Diplomacy since 1945. (CZ) C-L: Canadian Studies. One course. *Staff*

282S. Canada. (SS) A research seminar for advanced students familiar with Canada. Topics vary each semester; recent perspectives have included nationalism, Canadian-American relations, regionalism in the Maritimes and the West, and cross-border environmental issues, among others. C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 282S, Economics 282S, Interdisciplinary Course 282S, Political Science 282S, and Sociology 282S. One course. *Staff*

285S, 286S. Oral History. (SS) Research on race relations and civil rights in the United States in the twentieth century using techniques of oral history. Consent of instructor required. One course each. *Chafe and Goodwyn*

287S. American History and Social Theory. (CZ) Contemporary theories of social order, social change, and revolution. One course. *Goodwyn*

288S. Germany and Japan in World War II. (CZ) A comparative inquiry into the experience of these two capitalist "late developing" nations that turned to fascism and militarism in the 1930s. Topics include business and the state in wartime mobilization, wartime labor and productivity, the experience of women at work and at home, impact of firebombings, wartime propaganda and racism, postwar memory of the wartime era. One course. *Gordon and Koonz*

289S. War, Revolution, and Society in the Caribbean 1700-1815. (CZ) Explores the complex impact of European imperialism and the American, French, and Haitian revolutions upon Caribbean societies to the end of the Napoleonic wars. Military, economic, social, political, and institutional theories examined. One course. *Gaspar*

290S. Theoretical Bases of Social Interpretation. (SS) An interdisciplinary course on the historical development of theoretical formulations of particular importance to social historians and cultural anthropologists. Examines several fundamental problems posed by any effort to interpret social life. Considers how these problems show up and are handled within a number of approaches, loosely grouped as metaphysics, language, identity, and practice. C-L: Cultural Anthropology 220S. One course. *Reddy*

291S. Modern Jewish Politics. (SS) The development of the main currents in modern Jewish politics—nationalism, integrationism, and orthodoxy. Emphasis on the activities of these political movements in Europe and in the United States in the twentieth century. The influence of these movements on Israel. One course. *Mendelsohn*

295S. Slavery and Freedom in Africa, to 1960. (CZ) How Africans created variations on the global themes of servility, slavery, and freedom. Includes various forms of slavery in Africa; gender and slavery; slave trades; the impact of the Atlantic economy on slavery in Africa; colonial policies of "emancipation," labor control, and labor coercion; African intellectual responses to the problem of slavery and African expressions of freedom, including freedom from colonial rule. C-L: African and Afro-American Studies 292S and Comparative Area Studies. One course. *Ewald*

Upperclassmen-Graduate Seminars

See History 201S, 202S, 210S, 215S, 216S, 219S, 220S, 225S, 230S, 233S, 235S, 237S, 238S, 239S, 247, 252A, 252B, 253S, 254S, 255A, 258S, 265S, 267S, 268S, 269S-270S, 273S, 274S, 277S, 278S, 281S, 282S, 285S, 286S, 287S, 295S.

COURSES CURRENTLY UNSCHEDULED

94. The Age of Augustus. (CZ)

100M. Roman and Non-Roman in Ancient Italy. (CZ)

101H. Structures, Science, and Society. (CZ)

122B. Japan: Population, Resources, and Development, 1600-1940. (CZ)

128. Comparative Social Movements. (CZ)

135A. Germany from the Thirty Years' War to Unification in 1871. (CZ)

176S. The Southern Plantation as Historical Laboratory: Research Seminar. (CZ)

181. Alexander the Great. (CZ)

- 182C. History of Greek and Roman Civil Law. (CZ)
185. American Diplomacy from the Kennedy Administration to the Present. (SS)
204. German Society, 1914-1945. (CZ)
- 205S. Gender and War. (CZ)
- 207S. Geographic Perspectives in History I: Western Europe and the Americas. (SS)
- 208S. Geographic Perspectives in History II: Asian and Pacific Worlds. (SS)
212. The American Indian in the Revolutionary Era, 1760-1800. (CZ)
- 215S. The United States in International Relations: The Eighteenth and Nineteenth Centuries. (CZ)
- 218S. Perspectives on the Atlantic World. (CZ)
- 227-228. Recent United States History: Major Political and Social Movements. (CZ)
- 231S. Readings in Latin American Colonial History. (CZ)
- 243-244. Marxism and History. (SS)
- 245, 246. Social and Intellectual History of China. (CZ)
- 249-250. Social and Intellectual History of the United States. (CZ)
259. Archaic Greece. (CZ)
261. Alexander and the Hellenistic World. (CZ)
266. Late Antiquity. (CZ)
- 269S-270S. British History, Seventeenth Century to the Present. (CZ)

THE MAJOR

For Students Matriculating in Fall 1995 and Beyond:

The history major has two basic objectives. First, it seeks to offer students broad exposure to the histories of our own and other societies, to the recent and the more distant past, and to the variety of approaches to the study of history. Second, it seeks to allow study in depth of the history of a particular time and place, or a particular type of history. The goal of breadth is addressed in the distribution requirements for course work across three geographic areas and in premodern as well as modern history. Depth is achieved through the requirement that students identify a primary field of study.

Major Requirements. Ten history courses, two at the introductory level (that is, 21, 22, 75, 76, 91, 92) and eight at the 100 level or above.

The ten courses are to be distributed as follows:

1. At least two courses in each of three out of the four geographic areas, listed below.
2. At least four courses in the student's primary field of history. One of these must be a research seminar.

The eight 100-level and above courses are to be distributed as follows:

1. At least two courses that are pre-1800 in focus.
2. At least two research seminar courses. These are usually History 195S, History 196S, or 200-level courses. Substitution of other seminars must be approved by the director of undergraduate studies and the instructor.

Geographic Areas are (1) United States and Canada; (2) Europe (includes Britain and Russia); (3) Latin America, Mexico, Caribbean; (4) Africa, Middle East, Asia. In cases

of global or comparative courses, or other unclear cases, consult the history major's handbook or contact the Office of Undergraduate Studies.

Pre-1800 courses: 53, 54, 55, 98, 107A, 113, 116, 117, 119A, 119B, 121A, 124S, 126S, 127A, 131A, 131B, 132, 133A, 133B, 133C, 134A, 138, 143A, 145A, 148, 151A, 154A, 155, 156A, 156B, 157A, 158A, 168S, 169A, 171A, 173, 174A, 179, 183S, 187, 189A, 190, 193, 194, 195S, 196S (Sections 4, 11, 13, 15, 16, 19, 21, 32, 37, 40, 41, 48, 52, 72, and 80), 211A, 213S, 217, 219S, 221, 222, 231S, 233S, 237S, 238S, 251A, 251B, 259, 260, 263, 267S, 268S, 279, 289S, and 295S.

The primary field is defined as any one of the four geographic areas. In addition, a thematic area can serve as a primary field. Examples of thematic areas are (1) history of the African diaspora, (2) history of labor, (3) history of medicine, science, and technology, (4) history of women, (5) military history. Students may define other thematic areas, with approval of the director of undergraduate studies and the student's advisor.

Double counting: Courses can fulfill two or more requirements. For example, History 21 would count as "introductory," as "European," and for a student with primary focus on Europe, would count toward the primary area requirement. However, introductory courses do not count toward the pre-1800 requirement.

Advanced Placement: A student may receive course credit toward graduation for Advanced Placement history courses but the history department does not count Advanced Placement credits toward the requirements for the history major.

For Students Who Matriculated Before 1995:

Introductory Courses. Two introductory courses in history (21, 22; 21D, 22D; 21S, 22S; 91D, 92D; 91S, 92S; 93S).

Major Requirements. Eight courses in history including (1) at least two introductory courses (History 94 and 98 do not fulfill this requirement), (2) at least one course in each of three out of the five fields described above, (3) two courses in an undergraduate seminar (195S, 196S) or on the 200 level. Some of the courses at this level are two-semester sequences; a few of these require the student to take both semesters in order to get a grade. Except for these few cases, students are not required to take both semesters of two-semester courses.

Advanced Placement Credit. Two of the eight courses needed for the major may be fulfilled by advanced placement credits. If two additional advanced placement credits have been granted they may be applied toward the thirty-four credits needed for graduation, but may not be applied to the history major.

Transfer Credit. At least six of the eight courses required for the history major must be taken at Duke. Exceptions to this rule may be made for students with Advanced Placement credit who also study abroad while at Duke. In such instances, two Advanced Placement credits and two credits from a study abroad program may apply toward the eight courses required for the major.

Foreign Languages. Majors interested in a particular area of study benefit from knowledge of the language of that area. Majors who contemplate graduate work are reminded of the requirement of a reading knowledge of one or two foreign languages.

Majors Planning to Teach. Majors who plan to teach in secondary schools should consult an advisor in education. Rising juniors who intend to practice-teach in the senior year should take the 195S-196S or 197S-198S seminars or 200-level courses as juniors.

Honors/Distinction. Any student who is qualified (see the section on honors in this bulletin) may apply to the director of undergraduate studies for permission to undertake work leading to a degree with distinction in history.

History courses for undergraduates matriculating before 1995 are offered in five fields, as noted below. Students majoring in the department must complete at least one course in each of three fields. A course listed in two fields may be used to meet the requirement in either of those fields, but may not be used for both.

Africa, Asia, Canada, Caribbean, Latin America, Russia. History 75, 76, 98, 101C, 100E, 100I, 100J, 100Q, 100U, 101G, 101K, 101M, 102G, 104B, 108C, 108D, 109, 110, 112A, 112B, 114B, 115, 120, 122B, 123S, 124S, 127A, 127B, 128, 131A, 131B, 132, 136, 139A, 142A, 142B, 142C, 143A, 143B, 146, 152, 155, 158A, 159S, 161, 162A, 164, 167S, 168S, 170C, 172A, 174A, 174B, 179, 180, 183S, 184S, 186, 187, 193, 194; 195S, 196S sections 5, 8, 9, 17, 18, 20, 21, 22, 23, 29, 30, 34, 35, 36, 37, 40, 43, 45, 46, 49, 51, 57, 59, 65, 72, 73, 81, 82; 201S, 202S, 206, 208S, 218S, 225S, 230S, 231S, 233S, 234S, 239S, 243, 244, 245, 246, 247, 248, 252A, 252B, 257, 262, 265S, 275S, 282S, 295S.

Ancient, Medieval and Renaissance. History 21, 21D, 21S, 51, 53, 54, 55, 94, 100B, 100K, 107A, 116, 117, 125, 126S, 133A, 133B, 133C, 134A, 138, 148, 151A, 156A, 173, 174A, 178A; 195S, 196S sections 11, 13, 36, 37, 41, 48, 52, 80; 221, 222, 237S, 238S, 251A, 251B, 260, 263, 268S.

Medicine, Military, Science, Technology. History 101H, 118A, 118B, 123S, 132, 149, 154A, 157A, 157B, 157C, 163A, 163B, 178A, 189A, 189B, 190; 195S, 196S sections 4, 16, 75; 203S, 205S, 210S, 211A, 213S, 219S, 220S, 223S, 224S, 225S, 271S, 273S, 274S, 279, 280.

Modern Europe. History 21, 21D, 21S, 22, 22D, 22S, 100A, 100B, 100C, 100F, 100G, 100H, 100K, 100L, 100R, 100W, 100X, 101C, 101H, 101N, 107A, 107B, 109, 110, 112A, 112B, 113A, 113B, 114B, 117, 118C, 120, 123S, 126S, 128, 130A, 135A, 135B, 135C, 137, 138, 147A, 151A, 151C, 151E, 151F, 154A, 154D, 155, 156B, 158A, 168S, 171A, 171B, 173, 180, 188A; 195S, 196S sections 7, 10, 13, 15, 26, 28, 31, 32, 34, 36, 44, 48, 49; 204, 207S, 209S, 213S, 214, 221, 222, 223S, 224S, 225S, 239S, 240A, 241A, 252A, 256, 258S, 262, 268S, 271S, 272S.

United States. History 91, 91D, 91S, 92, 92D, 92S, 93S, 100I, 100Q, 101C, 101N, 103A, 108C, 108D, 111A, 111B, 111C, 114B, 118A, 119A, 119B, 121A, 121B, 121C, 123S, 124S, 128, 129A, 129B, 140S, 141S, 145A, 145B, 153, 155, 157A, 157B, 157C, 158A, 159S, 160, 162A, 163A, 163B, 163C, 165, 166S, 167S, 168S, 169A, 169B, 170C, 175S, 176S, 177A, 189B; 195S-196S sections 2, 3, 4, 6, 12, 14, 18, 19, 20, 24, 25, 27, 32, 33, 38, 40, 43, 45, 46, 49, 50, 54, 57, 66, 69, 74, 77, 78, 79; 205, 206, 211A, 212, 216S, 217, 223S, 224S, 225S, 226, 233S, 235S, 249-250, 252A, 255A, 271S, 275S, 277S, 278S, 281S, 285S, 286S, 287S.

House Courses (HC)

See the chapter "Academic Procedures and Information" for information on house courses.

Human Development Program

Professor Thompson, *Director*

A certificate, but not a major, is available in this program.

The goal of this interdisciplinary program is to broaden and enhance the perspectives of students interested in human development. The program seeks to foster an understanding and appreciation of how biological, psychosocial, and cultural factors act together in development throughout the life course; highlight the ways in which different disciplines conceptualize and study development; demonstrate the complementarity of disciplinary perspectives; and facilitate dialogue among faculty and students, illustrating the complementarity of and necessity for multidisciplinary perspectives.

Achievement of the program's goal is facilitated by an integrated curriculum of required and elective courses, a research apprenticeship, a lecture series, and other special events. An active advisory procedure assists students in planning learning opportunities. A certificate is available for students who complete program requirements. Participation in selective parts of the program and in the advisory system, however, is available to all undergraduates whether or not they seek the certificate.

The curriculum includes six courses, completion of which is required for the program certificate:

Interdisciplinary Course 124. Human Development. C-L: Psychology 124 and Sociology 124. *N. Anderson or Gustafson*

Either Psychology 159S (Biological Psychology of Human Development, Thompson) or Interdisciplinary Course 180, C-L: Psychology 130 and Sociology 169 (Psychosocial Aspects of Human Development, Staff)

Interdisciplinary Course 190. Research Apprenticeship in Human Development. *Thompson and staff*

Interdisciplinary Course 191S. Senior Seminar in Human Development. *Thompson and staff*

Two elective courses chosen from an illustrative list of biological, psychological, and social scientific courses affiliated with the program published in the program brochure. This list of elective courses includes Interdisciplinary Course 192S (Special Topics in Human Development).

The research apprenticeship arranged through the program and the related senior seminar would ordinarily be available only to students seeking the program certificate. Other components of the program are available to all undergraduates.

Immunology

For courses in Immunology, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates.

Interdisciplinary Courses (IDC)

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

75S. Genetics and Society in the Twentieth Century. (NS) The historical evolution of genetics and molecular biology in the twentieth century, examined within a social framework. Intended to enable students to place current issues such as the human genome project in historical perspective. From the eugenic and racial hygiene movements of America and Germany to the molecular biology revolution of the past half-century; the scientific principles underlying modern biotechnology. Open only to students in the FOCUS Program. One course. *Baker*

98. Introduction to Canada. (SS) History, economy, society, politics, and institutions of Canada. C-L: Canadian Studies, Comparative Area Studies, Economics 98, History 98, Political Science 98, and Sociology 98. One course. *LeClerc or Thompson*

99. Perspectives in Archaeology. (CZ) See C-L: Religion 99; also C-L: Classical Studies 99 and Judaic Studies. One course. *C. Meyers, E. Meyers, Younger, and staff*

101, 102. Introduction to the Civilizations of Southern Asia. (CZ) The literary, historic, linguistic, and ethnic diversity of South Asia presented through both readings and contemporary films. C-L: Asian and African Languages and Literature 160, 161; Comparative Area Studies; Cultural Anthropology 101, 102; History 193, 194; and Religion 160, 161. One course each. *Khanna or staff*

105A. Technology, the Environment, and Modern Culture. A course designed to emphasize the dimension of technology in the FOCUS Program, Science, Technology, and Modern Culture, and to provide a forum for discussing the relationship among the other courses in the program. Open only to students in that FOCUS Program and required of them. Pass/fail grading only. Half course. *FOCUS Program faculty*

105B. Issues of Contemporary American Culture. Open only to students in the FOCUS Program, Twentieth-Century America, and required of them. Intended to provide a forum for relating the other courses in the program. Weekly papers and discussion based on a series of programs and readings. Pass/fail grading only. Half course. *FOCUS Program faculty*

105C. Issues in Contemporary Global Culture. Viewed from indigenous and western perspectives. Open only to students in the FOCUS Program, Contemporary Global Culture, and required of all students in the program. Designed to provide a forum to develop the relationship among the other four courses in the program. Required

reading, discussion, and occasional papers. Pass/fail grading only. Half course. *FOCUS Program faculty*

105D. Symposium in Evolution and Humankind. A weekly discussion meeting intended to encourage participants in the FOCUS Program, Evolution and Humankind, to discuss interdisciplinary and synthetic topics emerging from their experiences in the program's constituent seminars. Open only to participants in the FOCUS Program. Pass/fail grading only. Half course. *FOCUS Program faculty*

105E. Issues in Late Medieval Europe. All students in the FOCUS Program in Medieval and Renaissance Studies meet weekly with faculty and FOCUS coordinator for discussion in this course, which bridges issues raised in the separate program courses and offers fresh perspectives on those issues. Open only to participants in the FOCUS Program and required of them. Pass/fail grading only. Half course. *FOCUS Program faculty*

105F. The Arts in Contemporary America. Discussions with practicing artists, writers, theater practitioners, musicians, and critics about their work and their sense of the place of their work in contemporary American society. Examination of performances, concerts, and exhibitions in the area. Open only to participants in the Arts in Contemporary America FOCUS Program. Pass/fail grading only. Half course. *FOCUS Program faculty*

106. Introduction to the Study of Literature and Society. (AL) See C-L: Literature 101; also C-L: Comparative Area Studies. One course. *F. Lentricchia or Willis*

108S. Science, Technology, and Human Values. (SS) Open to juniors and seniors in the Science, Technology, and Human Values Program and to other seniors if space is available. Consent of instructor required. One course. *Vesilind and staff*

111. Introduction to Linguistics. (SS) See C-L: Cultural Anthropology 107; also C-L: English 111 and Linguistics. One course. *Butters or Tetel*

112S, 113S. Topics in Science, Technology, and Human Values. Six four-week segments offered sequentially over the fall and spring semesters by faculty of the Program in Science, Technology, and Human Values. Credit for 112S or 113S is awarded for completion of three to five segments within a single academic year; credit for 112S and 113S for completion of six segments. Only students who take three segments in the fall semester should register for 112S; those who take no more than two segments in the fall and one or more segments in the spring semester should register instead for 113S in the spring. One course each. *Vesilind and staff*

115D. Perspectives in Gay, Lesbian, and Bisexual Studies. (CZ) Topics include homosexuality and history, religion, law, education, the arts and literature, the military, and the health sciences. C-L: English 101D. One course. *Staff*

118. Austrian Culture and Politics: Introduction to the Culture and Political Systems of Austria. (CZ) Offered as a part of the Duke in Vienna Program. One course. *Staff*

119. Current Topics in Linguistics. (SS) See C-L: Cultural Anthropology 112; also C-L: English 119 and Linguistics. One course. *Staff*

120. Perspectives on Food and Hunger. (SS) Issues of food and hunger from an interdisciplinary perspective. Lectures present analytic approaches from the natural sciences, social sciences, and the humanities. Pass/fail grading only. C-L: Comparative Area Studies. Half course. *Johns*

120A. Perspectives on Food and Hunger. (SS) See Interdisciplinary Course 120. Lectures, weekly discussion meetings, and individual research. C-L: Comparative Area Studies and Political Science 176A. One course. *Johns*

120B. Perspectives on Food and Hunger. (SS) See Interdisciplinary Course 120. Lectures, community internship project, and discussion meetings. C-L: Comparative Area Studies and Political Science 176B. One course. *Johns*

124. Human Development. (SS) Biological, behavioral, and cultural perspectives and approaches. Multidisciplinary. Especially for sophomores. Juniors and seniors by consent only. C-L: Human Development, Psychology 124, and Sociology 124. One course. *Anderson, Gustafson, and staff*

139. Marxism and Society. (SS) See C-L: Cultural Anthropology 139; also C-L: Comparative Area Studies, Education 139, History 186, Literature 139, and Sociology 139. One course. *Staff*

162, 163. Introduction to Islamic Civilization. (CZ) Extensive survey of Muslim peoples and institutions. 162: The Middle Eastern origins and cultural attainments of medieval Islam. 163: Modern developments and global features of the Islamic world. C-L: Comparative Area Studies; Cultural Anthropology 147, 148; History 101G, 102G; Medieval and Renaissance Studies; and Religion 162, 163. One course each. *Cornell, Lawrence, and staff*

164. History and Religions of North Africa. (CZ) See C-L: Religion 164; also C-L: African and Afro-American Studies 164, Comparative Area Studies, and History 187. One course. *Cornell*

180. Psychosocial Aspects of Human Development. (SS) See C-L: Psychology 130; also C-L: Human Development and Sociology 169. One course. *Staff*

182. Media in Comparative Perspective. (SS) Impact of mass media outside the United States. Cross-national comparisons of media content, audiences, and control. Relationships of governments to media and media policies. International flow of media materials and their cross-national impact. C-L: Canadian Studies, Comparative Area Studies, Film and Video, Political Science 180, and Sociology 182. One course. *Smith*

184S. Canadian Issues. (SS) Persistent and current issues facing the Canadian nation-state, among them: cultural and regional political divisions, Indian-Eurocanadian relations, the development of the Canadian welfare state, Canada's place in the international community and in the world economy. Prerequisite: Interdisciplinary Course 98 or consent of instructor. C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 184S, Economics 184S, History 184S, Political Science 184S, and Sociology 184S. One course. *Staff*

185S. The Canadian Health Care System. (SS) The Canadian health care system from its historical roots: social, political, legal, and economic aspects. An examination of how the system works from the point of view of society, the professional community, and the government. Comparative material included. C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 185S, Economics 185S, History 108E, Political Science 185S, Public Policy Studies 187S, and Sociology 185S. One course. *Boychuck or LeClerc*

186S. Research Internship in Primatology. (NS) Part of the Undergraduate Program in Primatology. Supervised work either in a laboratory or at the Primate Center. Consent of instructor required. C-L: Biological Anthropology and Anatomy 186S. One course. *Glander or White*

187S. Senior Seminar in Primatology. (NS) Part of the Undergraduate Program in Primatology. Consent of instructor required. C-L: Biological Anthropology and Anatomy 187S. One course. *Glander or White*

188S. The Diaghilev Ballet, 1909-1929. (AL) Prerequisite: junior or senior standing or consent of instructor. See C-L: Dance 188S. One course. *Dickinson and staff*

190. Research Apprenticeship in Human Development. Part of the Undergraduate Program in Human Development. Supervised work may be in a laboratory, project, or organizational setting. Consent of instructor required. C-L: Human Development. One course. *Thompson and staff*

191S. Senior Seminar in Human Development. (SS) Part of the Undergraduate Program in Human Development. Consent of instructor required. C-L: Human Development. One course. *Thompson and staff*

192S. Special Topics in Human Development. (SS) Part of the Human Development Program. Selected theoretical and methodological topics with emphasis on social change and public leadership in aging societies. C-L: Human Development. One course. *Staff*

198S. Current Topics on Latin America. Interdisciplinary study of geographical, historical, economic, governmental, political, and cultural aspects of modern Latin America and the current issues facing the region. For juniors and seniors. C-L: Comparative Area Studies. One course. *Staff*

210S. Topics in Slavic Studies. (CZ) Interdisciplinary study of the cultural, social, political, and economic dimensions of Russia, former Soviet republics, and Central and Eastern Europe. Topics vary each semester. Consent of instructor required. One course. *Staff*

234S. Political Economy of Development: Theories of Change in the Third World. (SS) See C-L: Political Science 234S; also C-L: Comparative Area Studies, Cultural Anthropology 234S, History 234S, and Sociology 234S. One course. *Staff*

282S. Canada. (SS) See C-L: History 282S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 282S, Economics 282S, Political Science 282S, and Sociology 282S. One course. *Staff*

299S. Seminar in German Studies. (CZ) See C-L: German 299S. One course. *Rollston and staff*

COURSES CURRENTLY UNSCHEDULED

155. Comparative Perspectives on Literature and Social Change: From Plantation to City. (AL)

205S. Gender and War. (CZ)

Interdisciplinary German Studies Program

Professor Borchardt, *Director*

A certificate, but not a major, is available in this program.

The program provides the opportunity for an interdisciplinary and in-depth study of the culture and civilization of the German-speaking peoples past and present.

Departments cooperating with the program include Art and Art History, Germanic Languages and Literature, History, Music, Philosophy, Political Science, Religion, and Sociology.

Students in the program will earn an Interdisciplinary German Studies Certificate after taking two years of German language study (or the equivalent) in the Department of Germanic Languages and Literature; an interdisciplinary capstone course; and four additional courses drawn from a large list of Interdisciplinary German Studies courses which must fall within thematic clusters. With the help of the director of the Interdisciplinary German Studies Program, it is possible for a student to design a curriculum that accommodates unusual interests.

Students may also elect this interest in Germany while participating in a Duke-approved study abroad program either during a summer or during their junior year.

Duke offers its own summer program at the Friedrich-Alexander University in Erlangen/Nürnberg and spring and fall semester programs at the Berlin universities. For further information consult the director of the program, 116H Old Chemistry Building.

Italian

For courses in Italian, see Romance Studies.

Japanese

For courses in Japanese, see Asian and African Languages and Literature.

Judaic Studies Program (Center for Judaic Studies)

Associate Professor Bland (religion), *Director and Director of Undergraduate Studies*; Professors Alt (Germanic languages and literature), Mendelsohn (history), C. Meyers (religion), E. Meyers (religion), Shatzmiller (history), and Wintermute (religion); Lecturer Zakim

A program in Judaic studies may be taken as part of a major in religion or as a supplement to any other major. It may also be taken under Program II. Students are eligible for a certificate in Judaic studies after completing four courses in the program. For descriptions of the courses consult the listings under the specified departments.

German (Yiddish)

1, 2. Elementary Yiddish. *Staff*

Hebrew

1, 2. Elementary Modern Hebrew. *Zakim*
63, 64. Intermediate Modern Hebrew. *Zakim*
125, 126. Advanced Modern Hebrew. *Zakim*
191, 192, 193, 194. Independent Study. *Staff*

History

134A. History of the Jews in the Middle Ages. *Shatzmiller*
147A. Jews in Eastern Europe. *Mendelsohn*
291S. Modern Jewish Politics. *Mendelsohn*

Interdisciplinary Course

99. Perspectives in Archaeology. *C. Meyers, E. Meyers, Younger, and staff*

Literature

131. Special Topics in Literature and the Judaic Tradition. *Staff*

Religion

40. Judaism. *Staff*
50. The Old Testament: Hebrew Bible. *C. Meyers, E. Meyers, Peters, or Wintermute*
101. Selected Studies in the Bible: Prophets. *Staff*
102. Selected Studies in the Bible: Writings. *Staff*
105. Theology of the Old Testament. *Wintermute*
109. Women in the Biblical Tradition: Image and Role. *C. Meyers*
110. Archaeology and Art of the Biblical World. *C. Meyers or E. Meyers*
115-116. Introduction to Biblical Hebrew. *Staff*
134. Jewish Mysticism. *Bland*

- 136. Contemporary Jewish Thought. *Bland or E. Meyers*
- 195B, 196B. Junior-Senior Seminars: Jewish and Christian Traditions. *Staff*
- 207, 208. Intermediate Biblical Hebrew. *Staff*
- 220. Rabbinic Hebrew. *E. Meyers or staff*
- 221. Readings in Hebrew Biblical Commentaries. *Bland*

Opportunities for independent study are also offered in the Department of Religion under 191, 192, 193, 194. Procedures for registration and applications are available in 118 Gray Building.

Special attention is directed to those courses in New Testament which are relevant to the study of Rabbinic Judaism—Religion 106, 107, 108, and 111.

Korean

For courses in Korean, see Asian and African Languages and Literature.

Latin

For courses in Latin, see Classical Studies.

Linguistics Courses

Students interested in the study of language as part of their undergraduate program or as preparation for graduate work in linguistics should consult the instructors of the courses listed below or Associate Professor Pugh, co-chair, Committee on Linguistics, 316 Languages Building. Students may concentrate in linguistics through Program II. For descriptions of the following courses see the listings of the specified departments.

Balto-Finnic

- 200. Balto-Finnic Linguistics. *Staff*

Cultural Anthropology

- 107. Introduction to Linguistics. *Butters or Tetel*
- 112. Current Topics in Linguistics. *Staff*
- 119. Language, Culture, and Society. *Apte, O'Barr, or Strauss*
- 211S. Ethnography of Communication. *Apte or O'Barr*
- 250S. Culture and Discourse. *Apte, Ewing, O'Barr, Quinn, or Strauss*

English

- 111. Introduction to Linguistics. *Butters or Tetel*
- 112. English Historical Linguistics. *Butters or Tetel*
- 118S. The Teaching of Composition, Grammar, and Literature in the Secondary School. *Teasley*
- 119. Current Topics in Linguistics. *Staff*
- 205. Semiotics and Linguistics. *Andrews*

French

- 131S. French in the New World. *Thomas*
- 210. The Structure of French. *Thomas*
- 211. History of the French Language. *Thomas*

German

- 260. History of the German Language. *Rasmussen*
- 262. Applied Linguistics. *Staff*

Interdisciplinary Courses

- 111. Introduction to Linguistics. *Butters or Tetel*
- 119. Current Topics in Linguistics. *Staff*

Philosophy

- 103. Symbolic Logic. *Brandon or Posy*
- 109. Philosophy of Language. *Posy*
- 228S. Recent and Contemporary Philosophy. *Posy*
- 250S. Topics in Formal Philosophy. *Posy*

Psychology

- 134. Psychology of Language. *Day*

Russian

- 185S. Introduction to Slavic Linguistics. *Andrews*
- 186S. History of the Russian Language. *Staff*
- 201S. A-D. Topics in Comparative Slavic Linguistics. *Andrews or staff*
- 203S. Old Church Slavonic. *Staff*
- 205. Semiotics and Linguistics. *Andrews*
- 208. Stylistic and Compositional Elements of Scholarly Russian. *Maksimova*

Spanish

- 109S. Structure of Spanish. *Staff*
- 210. History of the Spanish Language. *Garci-Gómez*

Literature Program (LIT)

Professor Jameson, *Chair*; Professor Kaplan, *Director of Undergraduate Studies*; Professors Fish, F. Lentricchia, Mignolo, Moi, V. Mudimbe, Radway, Rolleston, Schor, B. H. Smith, Stewart, Surin, Thomas, and Tompkins; Associate Professor Gaines; Assistant Professors Fischer, Hardt, and Moreiras; Research Professor Dorfman. Affiliated faculty: Professors Clum (English), Cooke (Asian and African languages and literature), and Torgovnick (English); Associate Professors Burian (classical studies), Morton (Germanic languages and literature), Wang (Asian and African languages and literature), and Willis (English); Assistant Professor Moses (English)

A major is available in this program.

20S. Introduction to Literature. (AL) Introduction to the study of literature and other forms of cultural expression, such as film. Different introductory approaches will be used in each section (for example, a systematic account of literary genres, a historical survey of ideas and forms of fiction, concepts of authorship and subjectivity, or of literary meaning and interpretation). More than one national literature or culture represented. One course. *Staff*

25. Third World Novel and Film. (AL) Exemplary novels and films from China, India, the Philippines, the Arabic world, and Latin America dramatizing a range of cultural responses to the social, political, and intellectual problems of postcolonial societies. Topics include the conflict between the old and the new; language revolution; the drama of family and clan; nationalism, nativism, and culturalism; the status of the intellectual; the arrival of consumerism; and the status of women. Open only to students in the FOCUS Program, Contemporary Global Culture. One course. *Staff*

25A. Third World Novel and Film. (AL) Same as Literature 25 but open to students not in FOCUS Program. One course. *Staff*

27S. Reading for Yourself. Literature as a point of departure for asking questions about how people learn. The literary texts used as means of exploration of the self, of the environment, and of our relationship to one another. Pass/fail grading only. One course. *Tompkins*

30. Special Topics in National Cinema. (AL) Understanding nationhood through film culture. Industrial base, reception history, and critical context for development of national cinemas. Exemplary films from a range of periods. C-L: Comparative Area Studies and Film and Video. One course. *Staff*

31. Special Topics in Hispanic Cinema. (AL) Focus on images of resistance in cinema from Spain and Latin America. Bunuel, followed by Spanish film under Franco compared with "Third Cinema" in Latin America. Course conducted in English. Knowledge of Spanish helpful but not required. C-L: Film and Video. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50. What Is Literature? (AL) Introduction to the idea of literature from an innovative and questioning position, to a number of major modern thinkers, and to theory in general. The relationship of literature to history; theories of reading and interpretation; and the concepts and structures of thought associated with modernism and postmodernism. One course. *Staff*

60. Contemporary Literary and Cultural Theory: An Introduction. (AL) The major concepts and principles of contemporary literary theory. "Poststructural" approaches to language and textuality, the invention of "postmodernism," and theories of history and literature. Vocabulary and tools necessary for reading and understanding contemporary critical and theoretical texts. One course. *Staff*

101. Introduction to the Study of Literature and Society. (AL) Literature in relation to history, social situation, and culture. Development of modes of interpretation that juxtapose textual features and broader contextual concern. Readings from Western and non-Western sources representative of a number of periods and genres. C-L: Comparative Area Studies and Interdisciplinary Course 106. One course. *F. Lentricchia or Willis*

102. Introduction to Cultural Studies. (AL) See C-L: English 101B; also C-L: Film and Video. One course. *Gaines, Radway, Surin, Tompkins, or Willis*

103. Great Books in the Western Tradition. (AL) A group of texts central to Western cultural identity from antiquity to the modern age, examined from a variety of critical and theoretical perspectives. Texts and topics vary according to the specializations of participating faculty, but in every case attention is given to such fundamental issues as the representation of "human nature;" the relations of individual and society, human and divine, male and female; the transmission and interrogation of ideas and values in literature; and the function of narrative itself in Western culture. One course. *Burian, Janan, or Morton*

104. Theoretical Approaches to Popular Culture. (CZ) Approaches to understanding different conceptions of local, popular, national, and global culture. Recent developments in cultural studies and literary theory, as they bear on the study of cultural communication in the late twentieth century. Particular attention devoted to how changes in economy, travel, global media coverage, and consumption are drawing the world's people closer together and at the same time generating a range of local responses. One course. *Surin*

121. Introduction to Asian and African Literature. (AL) See C-L: Asian and African Languages and Literature 121. One course. *Staff*

125. Art and Philosophy from West Africa to the Black Americas. (AL) See C-L: Art 174; also C-L: African and Afro-American Studies 154 and Comparative Area Studies. One course. *Powell*

126. Art and Material Culture of the Southern United States. (AL) See C-L: Art 175. One course. *Powell*

127. The Blues Aesthetic: Afro-American Art in the Twentieth Century. (AL) See C-L: Art 176; also C-L: African and Afro-American Studies 156. One course. *Powell*

129. Latin-American Literature in Translation. (AL) See C-L: Spanish 121; also C-L: Comparative Area Studies. One course. *Dorfman*

131. Special Topics in Literature and the Judaic Tradition. (AL) Selected topics or areas of the writings of the Judaic tradition such as ancient or modern Hebrew literature, Yiddish literature, Jewish mystical philosophy or the literature of the Holocaust. C-L: Judaic Studies and Yiddish 170. One course. *Staff*

132. Dada and Surrealism. (AL) The international dada and surrealist movement in its multiple manifestations: theater, painting, novel, film, autobiography, and manifesto. Knowledge of French or German desirable. C-L: Comparative Area Studies. One course. *Thomas*

133. Love, Marriage, and Adultery in the Nineteenth-Century European Novel. (AL) Focus on the tradition of the adulterous woman; her transgression of the social norms as a condensed passionate representation of the social, moral, and sexual conflicts of the time. Attention to questions of realism, genre, and plot structure. One course. *Moi*

134. Women in Jewish Literature. (AL) The development of images of Jewish women from biblical times to the present, in works for and about women, written by both male and female authors. Focus on literary craftsmanship as well as religious, historical, and political context. Texts include biblical works, Talmudic material, and selections from Yiddish, Hebrew, and Anglo-Jewish writers. C-L: Judaic Studies and Women's Studies. One course. *Staff*

135. National Identity. (AL) A study of literature that aims to define national experience. Topics might include the study of events (such as revolution, civil war) that foster national identity or put it into question, the notion of "imagined communities" and competing cultures, issues of national memory and amnesia and the intersection of gender with national identity. May be taught by a single faculty member or in teams. C-L: Comparative Area Studies. One course. *Hell, Kaplan, Longino, and/or Stewart*

136. Autobiography Across Cultures. (AL) A comparative approach to autobiography (including European language memoir, United States slave narrative, Latin American *testimonio*). How do people from different cultures and political situations tell the story of themselves? How does the relationship of individual to community vary according to these traditions and situations? Do men and women "construct a self" differently? C-L: Comparative Area Studies and Women's Studies. One course. *Kaplan or Willis*

137. Contemporary Culture in South Asia. (CZ) See C-L: Asian and African Languages and Literature 137; also C-L: Comparative Area Studies. One course. *Khanna*

139. Marxism and Society. (SS) See C-L: Cultural Anthropology 139; also C-L: Comparative Area Studies, Education 139, History 186, Interdisciplinary Course 139, and Sociology 139. One course. *Staff*

142S. Women in Arab Literature. (AL) See C-L: Asian and African Languages and Literature 173S; also C-L: Women's Studies. One course. *Cooke*

143. Canon and Corpus: Literary Studies in Colonial Situations. (AL) The function of literary studies in the context of the humanities and in a world of rapid changes and increasing internationalization. One course. *Mignolo or Willis*

144. Special Topics in Third World or Postcolonial Literature. (AL) Colonial and postcolonial literatures of India, New Zealand and Australia, Canada, Francophone and Anglophone Africa, the Caribbean, North and South America. Organized according to trends, topics, and genres. One course. *A. Davidson, Ferraro, Moses, or Willis*

146. The Canadian Image: Cultural Production in French and English Canada. (AL) What image do Canadians generate of themselves and the world and why? Popular and experimental work in English and French Canadian arts—primarily film and literature, but some painting and music—studied for their meaning in the making or unmaking of a social and political identity and a national image, from the 1960s to the present. C-L: Canadian Studies, Comparative Area Studies, and Film and Video. One course. *A. Davidson*

148S. Literature and Revolution: From the May Fourth to the Post-Mao Era. (AL) See C-L: Asian and African Languages and Literature 148S; also C-L: Comparative Area Studies. One course. *Wang*

150. Special Topics in Philosophy and Literature. (AL) The great philosophical texts or movements as expressive and linguistic phenomena; either with individual major figures such as Freud, Marx, Nietzsche or Hobbes, or with key theoretical and philosophical movements which have generated a body of texts significant for their literary as well as their philosophical value. One course. *Jameson, Moi, or staff*

151. Special Topics in Women Writers of the World. (AL) Issues of gender and representation in works by women from the Middle Ages to the modern period. Concentration on specific periods, areas, or themes. Relationship of women's literature to the other arts, political practices, and social developments. C-L: Comparative Area Studies and Women's Studies. One course. *Staff*

152. Special Topics in Regional Literatures of the Western World. (AL) Period documents—letters, memoirs, medical treatises, diaries, police records, court decisions, maps (studied together with poetry, short stories, plays)—meant to recreate a picture of life in a city and a region in particular moments in history. C-L: Comparative Area Studies. One course. *Staff*

153. Special Topics in Literature. (AL) Contents and methods vary with instructors and from semester to semester. One course. *Staff*

156. History of Mass Culture in the United States. (AL) See C-L: English 156. One course. *Gaines, Radway, Tompkins, or Willis*

157. International Popular Culture. (AL) Basic concepts in critical theory; folk vs. mass culture, appropriation, resistance, hegemony, as studied through Japanese, Chinese, Australian, British, East Indian, and Latin American popular forms. American imperialism and the exportation of mass forms juxtaposed with international reception of popular fiction, characters, music, and television programs. C-L: Comparative Area Studies and Film and Video. One course. *C. Davidson, Gaines, Radway, or Willis*

158. Studies in Comparative World Cinema and Television. (AL) History and theory of film and video technology across nations; postcolonial patterns and their electronic and mechanical transmission; economics of distribution, reception, exhibition, and their relation to aesthetics. The first world defined against the second and third by means of cultural product. C-L: Film and Video. One course. *Staff*

163. Twentieth-Century American Art: Identity and Nationalism. (AL) See C-L: Art 163. One course. *Powell*

167. Twentieth-Century Art, 1900-1945: The Avant-garde and Modernism. (AL) See C-L: Art 167; also C-L: Comparative Area Studies and Women's Studies. One course. *Cernuschi or Stiles*

168. Art since 1945: Modernism and Postmodernism. (AL) See C-L: Art 168; also C-L: Comparative Area Studies and Women's Studies. One course. *Cernuschi or Stiles*

172. Documentary Photography and Social Activism in the Nuclear Age. (AL) Not open to students who have taken Art 177B. See C-L: Art 169; also C-L: Comparative Area Studies. One course. *Stiles*

173. Drama and Theater from 1590 to 1700. (AL) See C-L: Drama 151; also C-L: English 174A. One course. *Blackadder, Clum, or Randall*

174. World Theater: Realism and Modernisms. (AL) See C-L: Drama 152; also C-L: English 174B. One course. *Blackadder, Clum, or Riddell*

175A. Modernism and Modernity I. (AL) The classic phase of modernism: a new, experimental writing emerging from and responding to a new social and political world. Authors studied include Ibsen, Strindberg, Chekhov, Yeats, Joyce, Kafka, and Eliot. One course. *Lentricchia*

175B. Modernism and Modernity II. (AL) The self-conscious phase of modernism; experimental art turned upon itself. Poetry as the subject of the poem. Authors studied include Pirandello, O'Neill, Beckett, Stevens, Borges, Barthelme, Calvino, Fellini, and DeLillo. One course. *Lentricchia*

176. The History of Performance Art. (AL) See C-L: Art 179; also C-L: Comparative Area Studies, Drama 179, and Women's Studies. One course. *Stiles*

178. Soviet Cinema. (AL) See C-L: Russian 130; also C-L: Film and Video. One course. *Gaines, Jameson, and Lahusen*

179. Contemporary Science Fiction. (AL) Major writers in the tradition of utopia and science fiction since the 1960s, in particular LeGuin, Dick, and Delany. The formal distinction between science fiction and fantasy, innovations in narrative structure, concepts of utopia and dystopia, and the relationship between the genre and the social history of the 1960s and 70s. One course. *Staff*

180. Writings in the Rural Tradition: From the Caribbean to the American South. (AL) Comparative readings of fiction and poetry from the southern United States and the Caribbean, analyzed in relation to the plantation heritage. C-L: African and Afro-American Studies 180, Comparative Area Studies, and English 180. One course. *Willis*

181. Literacies and Literatures in the Americas and the Caribbean. (AL) An exploration of the social process as well as historical and cultural relevance of the uses of literacy in multilingual and pluricultural realities of the Americas and the Caribbean. C-L: Comparative Area Studies. One course. *Mignolo or Willis*

182S. The Forbidden Books: Issues of Censorship in China. (AL) See C-L: Asian and African Languages and Literature 182S; also C-L: Comparative Area Studies. One course. *Wang*

184. Introduction to Psychoanalytic Criticism. (AL) Emphasis on texts by Freud and Lacan and the textual theories closely associated with their work. Psychoanalytic theories of art and creativity ranging from Ernest Jones and Hanna Segal to Janine Chasseguet-Smirgel, Sarah Kofman, and Julia Kristeva. Various theories of the relationship between the psychological and the social. One course. *Moi*

185. Psychoanalysis, Literature, and Film. (AL) Genres, styles, and schools in film and literature that attract psychoanalytic readings and raise issues of gender and sexuality: the gothic, horror, melodrama, and romance fiction; surrealism and the avant-garde. C-L: English 181, Comparative Area Studies, Film and Video, and Women's Studies. One course. *Gaines*

186. Sexualities in Film and Video. (AL) The variety of ways sexualities are represented in current mainstream and avant-garde film and video art. Topics include voyeuristic, narcissistic, and other perverse pleasures; modes of representing bodies, genders, and desires (especially gay and lesbian ones) in relation to national and subcultural identities. Readings in film theory as well as related literary and critical texts. C-L: Film and Video. One course. *Clum, Gaines, or Moon*

187. Studies in Film History. (AL) See C-L: English 185; also C-L: Drama 136 and Film and Video. One course. *Clum, Gaines, or Jameson*

188. Twentieth-Century Modernist and Postmodernist Criticism. (AL) See C-L: Art 188. One course. *Cernuschi or Stiles*

189. Modern and Postmodern Architecture. (AL) See C-L: Art 189. One course. *Wharton*

190S. Senior Seminar. (AL) Topics vary each semester offered. One course. *Staff*

191, 192. Independent Study. Consent of instructor required. One course each. *Staff*

194S. Topics in Advanced Film, Video, or Audio Production. (AL) An in-depth investigation of a particular technology. Exploration of the theoretical assumptions behind the development of new technological arts of the twentieth century. Consent of instructor required. C-L: Film and Video. One course. *Staff*

195S. Documentary Film and Fiction. (AL) The study of different documentary forms such as fiction, nonfiction, video, and film, focusing on the way that historical and political contexts relate to them. Examples include Don DeLillo, Marcel Ophuls, Joyce Carol Oates, and Christa Wolf. Open to juniors and seniors only. One course. *Kaplan and Orr*

198. Censorship, Law, and Literature. (AL) The history and theoretical implications of censorship as a worldwide phenomenon that, from Plato's time to our own, illuminates many other issues: the role of law in mediating culture; the role of literature in testing the frontiers of cultural change; the relationship between political structures and private, sexual morality. Emphasis on censorship law internationally, on its relation to treason, sedition and libel laws, and the concept of heresy. Clarification of First Amendment issues, and interpretation of certain crucial "literary" trials, such as those concerning Flaubert's *Madame Bovary*, Joyce's *Ulysses*, and Lawrence's *Lady Chatterly's Lover*. Broad historical and international focus also maintained. One course. *Staff*

211. Theory and Practice of Literary Translation. (AL) Linguistic foundations and historical role of translation. Practical exercises and translation assignments. Prerequisites: working knowledge of a foreign language and consent of instructor. One course. *Burian*

212. Studies in Narrative. (AL) Topics to vary. One course. *Staff*

214. Gender, Nationalities, and Russian Literary Traditions. (AL, CZ) See C-L: Russian 214; also C-L: Women's Studies. One course. *Gheith*

254. Introduction to Feminism. (AL) Major trends and tendencies of feminist theory and its history. Perspectives are both international as well as Third World and interdisciplinary. Various feminist methodologies as well as crucial polemics. One course. *Moi, Radway, or Schor*

280. Semiotics for Literature. (AL) See C-L: French 223. One course. *Thomas*

293. Literature and History. (AL) Relationship of literary texts to varieties of historical experience such as wars, periods of revolutionary upheaval, periods of intense economic growth, "times of troubles," or stagnation. Literary texts and historical content posed in such formal ways as the theoretical problem of the relationship between literary expression and form and a range of historical forces and phenomena. One course. *Jameson, Kaplan, Orr, or Schor*

COURSES CURRENTLY UNSCHEDULED

100. Introduction to Comparative Literature. (AL)

122. The American Imagination. (AL)

128. Writings in the Pan-African Tradition. (AL)

145. The Descent of the Epic. (AL)

149. Feminism in Twentieth-Century Art. (AL)

155. Comparative Perspectives on Literature and Social Change: From Plantation to City. (AL)

159. Tragedy and the Tragic. (AL)

171. The History of Conceptual Art. (AL)

177. Film Theory. (AL)

THE MAJOR

All students must be able to demonstrate reading knowledge of at least one foreign language either through advanced placement or completion of the appropriate course work. In addition, literature students will be asked to fulfill the requirements in one of two tracks. When students declare the literature major, they will be asked to inform the director of undergraduate studies of the track selected and to work out a tentative course of study.

(1) Literature and Cultural Theory

This track has been designed to enable students to concentrate their efforts upon a comparative study of world literatures. It is understood that the director of undergraduate studies will encourage majors in this track to develop a coherent rationale for the kind of comparisons they are undertaking (for example, of specific national literatures, within a particular historical period) and will ensure that students take an appropriate number of more theoretical courses as well. Students will be required to take a total of eight courses distributed in the following manner:

a. *One* course (appropriate to the student's particular interests) which engages the idea of literature from a theoretical, procedural, or comparative perspective. Students should choose from the following list of courses: Literature 50, 100, 101, and 102.

b. *Five* courses in the Program in Literature to be approved by the director of undergraduate studies.

Students who are not completing honors in the program must plan to include at least one seminar course among these five. This requirement will normally be fulfilled by taking Literature 190, the senior seminar. The seminar will be a topical, problem-oriented seminar focused on a broad subject such as society and psychoanalysis. The point of the course will be to raise theoretical questions and to enable the students to think more systematically about the procedures, rationale, and methods of literary study. Non-honors students will be asked to submit a substantial research paper at the end of the course.

Honors students will be asked to include two seminar courses among their five. This requirement will be fulfilled by taking Literature 190, the senior seminar, in the fall of the senior year, and Literature 191, the honors thesis, in spring of the senior year. Students must apply for this honors sequence by February 15 of the junior year. Applicants must have completed at least two Literature Program courses and one course in the literature of a foreign language and have a minimum B+ average in those courses. Applicants should apply to the director of undergraduate studies and must include a writing sample, a letter from one of their instructors, and the name of a thesis advisor, who will coordinate the evaluation of the thesis. The Literature Program's honors committee will evaluate all applications and the final theses themselves. Students not awarded the honors designation will receive graded credit for Literature 190 and

Literature 191. For honors by honors project the minimum overall grade point average for *cum laude*, *magna cum laude*, and *summa cum laude* will be 3.3, 3.4, and 3.7, respectively.

c. Two courses in literature taught in a foreign language. The topics, periods, and foci of these courses should intersect in some way with the courses elected from within the Literature Program.

(2) Literature and Media Studies

This track has been designed to meet the needs of the many students who wish to elect a literature major but who want to concentrate more specifically upon the contemporary media and their attendant technologies. Students will be asked to develop a rationale for their course selection and to demonstrate to the director of undergraduate studies that they have addressed both theoretical and substantive questions in the courses they have taken. Students will be required to take a total of eight courses distributed in the following manner:

a. Literature 102, Introduction to Cultural Studies.

b. Three courses in the Program in Literature. Non-honors students must include one seminar course among these three. This requirement will normally be fulfilled by Literature 190, the senior seminar. Honors students must include two seminar courses among these three. This requirement will be fulfilled by Literature 190 and Literature 191. For honors procedures, see listing under Track (1).

c. Two courses in literature from the following list: Literature 156, 177, 179, 185, and 187.

d. One course from outside the Literature Program in the area of media studies (for example, English 187, Cultural Anthropology 110, Public Policy Studies 163S, Public Policy Studies 177S, Public Policy Studies 180S). This course must be approved by the director of undergraduate studies.

e. One literature course in a foreign language at the 100 level or above.

Management Sciences Courses (MS)

The courses listed below are elective courses, which do not count for area of knowledge requirements in Trinity College. A major is not offered in management sciences. The courses may be helpful in preparation for graduate education in business and law and may provide liberal arts, science, and engineering students an advancement in placement. For courses in accounting, see Economics.

120. Managerial Effectiveness. Understanding the nature of management and the factors that influence the effective performance of managers. Topics include the nature of managerial effectiveness; managing groups; leadership strategies; performance motivation and appraisal; conflict management; the manager as decision maker and negotiator. Prerequisite: junior standing. One course. *Staff*

161. Marketing Management. The role of the marketing function in business; product planning, price, promotion, and distribution as elements of a total marketing mix. Formal models in solving the marketing mix problem of the firm. Prerequisite: junior standing. One course. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified juniors and seniors with consent of instructor and director of undergraduate studies. Variable credit. *Staff*

Marine Biology

For courses in marine biology, see Biology, Environment (School), and the University Program in Marine Sciences.

The University Program in Marine Sciences

Professor Ramus (botany and environment), *Director*; Professor Forward (zoology and environment), *Assistant Director and Director of Undergraduate Studies*; Professors Barber (botany, environment, geology, and zoology), C. Bonaventura (cell biology and environment), J. Bonaventura (cell biology and environment), Pilkey* (geology), and Searles† (botany); Associate Professor Rittschof (zoology and environment); Assistant Professors Howd (environment) and Lozier (environment); Professor Emeritus Bookhout (zoology); Professor of the Practice Orbach (environment); Associate Professor of the Practice Kirby-Smith (environment); Research Professor Brouwer (environment)

The interdisciplinary program in marine sciences provides students with a unique opportunity to live and study at the Duke University Marine Laboratory for a full academic semester—fall or spring or during the summer terms. The program emphasizes small class size, independent study, and integrated classroom, laboratory, and field experience. Students have daily access to modern scientific equipment, a specialized library, and the surrounding natural marine environment.

The fall and spring semesters are offered primarily for juniors and seniors. Participation in either the fall or spring semester is possible for all majors with appropriate preparation. Before attending a semester program, it is advised that students have completed introductory college courses in biology, chemistry, mathematics, and physics. Students wishing to apply to the fall or the spring semester must submit an application form which contains the written approval of their faculty advisor to the Admissions Office, Duke University, School of the Environment, Marine Laboratory, 135 Duke Marine Lab Road, Beaufort, North Carolina 28516-9721, prior to Duke's registration period for the desired semester. Students will be notified of the action of the Admissions Committee shortly after receipt of their application. Applications received after Duke's registration period for the desired semester will be considered if space is available.

The summer curriculum, taught in three terms, includes a rich assortment of courses in the natural sciences. Attention is also directed to the introductory course in marine biology (Biology 10L), designed specifically for students not majoring in a natural science.

Applications for summer courses must contain the written approval of the student's advisor or dean, must be accompanied by a current academic transcript and should be submitted by the end of March or earlier to the address indicated above. Thereafter, applications will be considered if space is available.

A number of summer tuition scholarships are available on a competitive basis. Please consult the *Marine Laboratory 1995* publication for specific requirements and deadline dates, or contact the Admissions Office of the Marine Laboratory.

The courses below are described in the bulletin listings of the specified departments. See also the *Marine Laboratory 1995* publication and the Duke University *Official Schedule of Courses* for the current schedule of courses. For information on courses fulfilling requirements of the biology, environmental studies and policy, or geology major consult the director of undergraduate studies for the major.

FALL, SPRING, OR SUMMER COURSES AT BEAUFORT

Marine Biology. (Biology 10L.) For students not majoring in a natural science. One course. Kenney

*Spring only.
†Summer only.

Behavioral Ecology. (Biology 113L.) Prerequisite: Biology 21L, 22L. One and one-half courses. *Rubenstein (visiting summer faculty)*

Biological Oceanography. (Biology 114L.) Prerequisite: Biology 21L, 22L. One course (fall or spring); one and one-half courses (summer). *Barber or Ramus*

Analysis of Ocean Ecosystems. (Biology 123.) Prerequisite: one year of biology and chemistry, or consent of instructor. One course. *Barber*

Physiology of Marine Animals. (Biology 150L.) Prerequisites: Biology 21L, 22L; and chemistry. One course (fall or spring); one and one-half courses (summer). *Forward*

Biochemistry of Marine Animals. (Biology 155L.) Prerequisites: Biology 21L, 22L; and Chemistry 11L, 12L. One course. *Rittschof*

Marine Communities. (Biology 169L.) Prerequisites: Biology 21L, 22L; and Mathematics 31. One course. *Staff*

Marine Invertebrate Zoology. (Biology 176L.) Not open to students who have taken Biology or Zoology 274L. Prerequisite: Biology 21L, 22L. One course (fall or spring); one and one-half courses (summer). *Kirby-Smith*

Independent Study. (Biology 191, 192; Environment 191, 192; Geology 191, 192, 195; or as listed under the student's major department.) For junior and senior majors with consent of appropriate director of undergraduate studies and supervising instructor. Credit to be arranged. *Staff*

Light in the Sea. (Biology 195S or Biology 196S.) Half course. *Ramus*

Human Impact on the Natural Environment. (Biology 195S or Biology 196S.) Half course. *Barber*

Marine Ecology. (Biology 203L or Environment 219L.) Prerequisite: none; suggested—introductory ecology, invertebrate zoology, or marine botany. One course (fall or spring), one and one-half courses (summer). *Kirby-Smith or staff*

Barrier Island Ecology. (Biology 218L or Environment 218L.) Prerequisite: introductory biology; suggested: course in botany or ecology. One and one-half courses. *Evans, Peterson, and Wells (visiting summer faculty)*

Biology of Marine Invertebrates. (Biology 274L or Environment 297L.) Not open to students who have had Biology 176L. Prerequisite: Biology 21L, 22L or equivalents. One and one-half courses. *Dimock (visiting summer faculty)*

Marine Animal Navigation. (Biology 295S or Biology 296S.) Half course. *Forward*

The Ecology of Chemical Signals. (Biology 295S or 296S.) Half course. *Rittschof*

Environmental Biochemistry. (Cell Biology 243 or Environment 243.) Prerequisite: organic chemistry. One course. *C. Bonaventura and Brouwer*

Cellular and Molecular Research Techniques. (Cell Biology 244L or Environment 244L.) Prerequisite: organic chemistry. One course. *C. Bonaventura and Brouwer*

Physical Processes in Coastal Environments. (Environment 222 or Geology 201.) Prerequisites: Mathematics 31 and 32. One course. *Howd*

Coastal Ecotoxicology and Pollution. (Environment 225L.) Prerequisites: introductory chemistry and biology. One course. *Kenney*

Marine Mammals. (Environment 226L.) Prerequisite: introductory biology. One course. *Staff*

Statistics and Data Analysis in Earth and Ocean Science. (Environment 252L or Geology 222L.) Prerequisites: Mathematics 31 and 32, Statistics 110 or 112 or consent of instructor. One course. *Howd*

Seminar in Ocean Sciences. (Environment 256S.) Consent of instructor required. Half course. *Staff*

Marine Fisheries Policy. (Environment 273.) One course. *Orbach*

Marine Policy. (Environment 276 or Public Policy Studies 197.) Consent of instructor required. One course. *Orbach*

Geological Oceanography. (Environment 291 or Geology 205.) Not open to students who have taken Geology 206S. One course. *Staff*

The Oxygen Paradox: An Essential Environmental Pollutant. (Environment 298.) Half course. *Brouwer*

Beach and Island Geological Processes. (Geology 196S.) Half course. *Pilkey*

COURSES CURRENTLY UNSCHEDULED

Macromolecules, Ecology, and Evolution. (Biochemistry 245L.)

Marine Biochemistry and Genetics. (Biochemistry 266S.)

Comparative and Evolutionary Biochemistry. (Biochemistry 276L.)

Tropical Seaweeds. (Biology 263L.)

Marine Fishes: Selected Topics. (Biology 295S or Biology 296S.)

Natural History of Coastal Marine Systems. (Biology 295S or 296S.)

Experimental Ecology of the Marine Intertidal Zone. (Biology 296S.)

The Coastal Environment: Science vs. Policy. (Biology 295S.)

Analysis of Coastal Ecosystems. (Biology 296S.)

Advanced Research Training in Marine Molecular Biology and Biotechnology. (Cell Biology 235 or Environment 254, or Cell Biology 235L or Environment 254L.)

Molecular and Cellular Adaptations of Marine Organisms. (Cell Biology 270S or Environment 224S.)

Markets and Management Studies

Professor Spenner, Director

A certificate, but not a major, is available in this program.

The program offers students the opportunity to take a cluster of courses dealing with problems of how organizations are formed and managed, how transactions between people and organizations are structured in markets, how and why patterns of consumption change, what distinguishes good from bad management in both the practical and ethical sense, how approaches to management and marketing have changed over time, and how these approaches vary from one country and one sector of the economy to another. The program should be of particular interest to students interested in pursuing a career in business.

In addition to offering courses and a certificate on completion of the requirements, the Markets and Management Program also sponsors lectures, films, discussions and internships. It offers career counseling for prebusiness students, who are invited to make use of a resource room (Room 256 in the Department of Sociology) for meetings with faculty and other students in the program, and to consult relevant journals and newspapers. Additional information may be obtained from Professors Spenner or Wilson in the sociology department.

COURSE OF STUDY

The course of study for program participants is intended to be interdisciplinary. The core of the program consists of sociology courses, with a large number of electives available for selection from eight other departments. The certificate requires six courses, two of which must be drawn from a core set of management and markets studies courses. The third core course is the capstone course, an integrative course taken in the senior year. The rest of the courses are considered electives, and at least two of these must be taken in departments other than sociology.

PROGRAM COURSES

Core Courses

Sociology 142. Organizations and Global Competitiveness

Sociology 144. Organizations and Environments

Sociology 155. Organizations and Management

Sociology 158. Markets and Marketing

Sociology 159. The Sociology of Entrepreneurship

Sociology 190. Markets and Management (Capstone course)

Elective Courses

Cultural Anthropology 110. Advertising and Society
Economics 130. The Changing Role of the Market in the Social System
Economics 134. Japanese Economy and History
Economics 140. Comparative Economic Systems
Economics 142. Chinese Economy in Transition
Economics 165. American International Economic Policy
Economics 173. Economics of Organization and Management
Economics 188. Industrial Organization
Economics 189. Business and Government
Education 140. The Psychology of Work
History 143B. The Emergence of Modern Japan
Interdisciplinary Course 112S, 113S. Topics in Science, Technology, and Human Values
Management Science 120. Managerial Effectiveness
Management Science 161. Marketing Management
Political Science 113. International Political Economy
Political Science 121. International Organization
Political Science 147. Environmental Politics and Policies in the Developing World
Public Policy Studies 145D. Leadership, Policy, and Change
Public Policy Studies 146. Leadership and Judgment
Public Policy Studies 195S.61. Corporate Leadership
Religion 151. Ethical Issues in Social Change and Public Policy
Religion 174. Technology Assessment and Social Change
Sociology 110B.01. Comparative Sociology: Asia
Sociology 112. American Demographics
Sociology 126. Third World Development
Sociology 135. Computers and Society
Sociology 143. Management and Labor Relations
Sociology 156. Global Contexts of Science and Technology
Sociology 165. Occupations, Professions, and Careers
Sociology 195S. Consuming Passions

Mathematics (MTH)

Professor Harer, *Chair*; Professor Pardon, *Associate Chair*; Associate Professor Scoville, *Director of Undergraduate Studies*; Assistant Professor of the Practice Blake, *Supervisor of Freshman Instruction*; Professors Allard, Beale, Bryant, Hain, Lawler, Morrison, Reed, Rose, Schaeffer, Stern, Trangenstein, Venakides, Warner, and Weisfeld; Associate Professors Burdick, R. Hodel, Kitchen, Kraines, Moore, Saper, Schoen, Smith, and Zhou; Assistant Professors Layton, Yang, and Zheng; Professors Emeriti Carlitz, Dressel, Murray, Roberts, and Shoenfield; Assistant Professor of the Practice Bookman; Adjunct Professors Chandra and Shearer; Lecturers Dempster, M. Hodel, and Morris; Instructors Dong, Khan, and Puckette

A major is available in this department.

19. Precalculus Mathematics. (QR) For students with CB Achievement Test scores between 460 and 540 or SAT scores between 500 and 600. Selected topics in algebra, trigonometry, and analytic geometry; projects and writing assignments. Designed to increase the mathematical skills and knowledge of students planning to enroll in Mathematics 31. One course. *Staff*

31. Introductory Calculus I. (QR) Functions, limits, continuity, trigonometric functions, techniques and applications of differentiation, indefinite and definite integrals, the fundamental theorem. One course. *Staff*

31L. Laboratory Calculus I. (QR) Introductory calculus with a computer laboratory component. Emphasis on projects, group work, and written reports. Differentiation, transcendental functions, differential equations, numerical approximations. One course. *Staff*

32. Introductory Calculus II. (QR) Transcendental functions, techniques and applications of integration, indeterminate forms, improper integrals, infinite series. Not open

to students who have had Mathematics 41. Prerequisite: Mathematics 31 or 33. One course. *Staff*

32L. Laboratory Calculus II. (QR) Second semester of introductory calculus with a computer laboratory. Emphasis on projects, group work, and written reports. Integration, the fundamental theorem, methods of integration, improper integrals, polynomial approximation. Not open to students who have had Mathematics 41. Prerequisite: Mathematics 31L or consent of instructor. One course. *Staff*

32X. Introductory Honors Calculus II. (QR) Similar to Mathematics 32, but faster paced and more challenging. Open to students who score at least 750 on the SAT Mathematics Aptitude Test. One course. *Staff*

41. One Variable Calculus. (QR) Meets five times a week, quickly reviews differential calculus and then covers integral calculus and infinite series. Designed for freshmen who have had a year of calculus in high school and have Mathematics SAT scores of 650 or above, but who have not received advanced placement credit for Mathematics 31. Not open to students who have had Mathematics 31 or 32 or 31L or 32L. One and one-half courses. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

103. Intermediate Calculus. (QR) Partial differentiation, multiple integrals, topics in differential and integral vector calculus. Prerequisite: Mathematics 32, 32L, or 41. One course. *Staff*

103L. Laboratory Calculus III. (QR) Intermediate calculus with a computer laboratory. Emphasis on projects, group work, and written reports. Curves in space, partial differentiation, multiple integrals, two-dimensional vector calculus. Prerequisite: Mathematics 32, 32L, or 41, or consent of instructor. One course. *Staff*

103X, 104X. Honors Intermediate Calculus and Linear Algebra. (QR) Similar to Mathematics 103, 104, but more theoretical. Students who have taken 32X are encouraged to enroll. Students continuing from 103X should take 104X rather than 104. One course each. *Staff*

104. Linear Algebra and Applications. (QR) Systems of linear equations and elementary row operations, Euclidean n -space and subspaces, linear transformations and matrix representations, Gram-Schmidt orthogonalization process, determinants, eigenvectors and eigenvalues; applications. Prerequisite: Mathematics 32 or 41. One course. *Staff*

111. Applied Mathematical Analysis I. (QR) First and second order differential equations with applications; matrices, eigenvalues, and eigenvectors; linear systems of differential equations; Fourier series and applications to partial differential equations. Intended primarily for engineering and science students with emphasis on problem solving. Not open to students who have had Mathematics 131. Prerequisite: Mathematics 103. One course. *Staff*

114. Applied Mathematical Analysis II. (QR) Boundary value problems, complex variables, Cauchy's theorem, residues, Fourier transform, applications to partial differential equations. Not open to students who have had Mathematics 181 or 230. Prerequisites: Mathematics 111 or 131, or 103 and consent of instructor. One course. *Staff*

120S. Introduction to Theoretical Mathematics. (QR) Topics from set theory, number theory, algebra, and analysis. Recommended for prospective mathematics majors who feel the need to improve skills in logical reasoning and theorem-proving before taking Mathematics 121 and 139. Not open to students who have had Mathemat-

ics 121, Mathematics 139, or equivalents. Prerequisite: Mathematics 103; corequisite: Mathematics 104. Half course. *Staff*

121. Introduction to Abstract Algebra. (QR) Groups, rings, and fields. Students intending to take a year of abstract algebra should take Mathematics 200 and 201. Not open to students who have had Mathematics 200. Prerequisite: Mathematics 104 or 111. One course. *Staff*

123S. Geometry. (QR) Euclidean geometry, inverse and projective geometries, topology (Möbius strips, Klein bottle, projective space), and non-Euclidean geometries in two and three dimensions; contributions of Euclid, Gauss, Lobachevsky, Bolyai, Riemann, and Hilbert. Prerequisite: Mathematics 32 or 41, or consent of instructor. One course. *Staff*

124. Combinatorics. (QR) Permutations and combinations, generating functions, recurrence relations; topics in enumeration theory, including the Principle of Inclusion-Exclusion and Polya Theory; topics in graph theory, including trees, circuits, and matrix representations; applications. Prerequisite: Mathematics 104 or consent of instructor. One course. *Staff*

126. Introduction to Linear Programming and Game Theory. (QR) Fundamental properties of linear programs; linear inequalities and convex sets; primal simplex method, duality; integer programming; two-person and matrix games. Prerequisite: Mathematics 104. One course. *Staff*

128. Number Theory. (QR) Divisibility properties of integers, prime numbers, congruences, quadratic reciprocity, number-theoretic functions, simple continued fractions, rational approximations; contributions of Fermat, Euler, and Gauss. Prerequisite: Mathematics 32 or 41, or consent of instructor. One course. *Staff*

128S. Number Theory. (QR) Same as Mathematics 128, but offered as a seminar. One course. *Staff*

131. Elementary Differential Equations. (QR) Solution of differential equations of elementary types; formation and integration of equations arising in applications. Not open to students who have had Mathematics 111. Prerequisite: Mathematics 103; corequisite: Mathematics 104. One course. *Staff*

132S. Qualitative Theory of Ordinary Differential Equations. (QR) Qualitative behavior of general systems of ordinary differential equations, with application to biological and ecological systems, oscillations in biochemistry, electrical networks, and the theory of deterministic epidemics. Prerequisite: Mathematics 131 or 111 or consent of instructor. One course. *Staff*

135. Probability. (QR) Probability models, random variables with discrete and continuous distributions. Independence, joint distributions, conditional distributions. Expectations, functions of random variables, central limit theorem. Prerequisite: Mathematics 103. C-L: Statistics 104. One course. *Staff*

135S. Probability. (QR) Seminar version of Mathematics 135. In addition, each student will be required to do a project which illustrates the theory. Prerequisite: Mathematics 103. C-L: Statistics 104S. One course. *Staff*

136. Statistics. (QR) Sampling distributions, point and interval estimation, maximum likelihood estimators. Tests of hypotheses, the Neyman-Pearson theorem. Bayesian methods. Not open to students who have had Statistics 112 or 213. Prerequisites: Mathematics 104 and 135. C-L: Statistics 114. One course. *Staff*

139. Advanced Calculus I. (QR) Algebraic and topological structure of the real number system; rigorous development of one-variable calculus including continuous,

differentiable, and Riemann integrable functions and the Fundamental Theorem of Calculus; uniform convergence of a sequence of functions; contributions of Newton, Leibniz, Cauchy, Riemann, and Weierstrass. Not open to students who have had Mathematics 203. Prerequisite: Mathematics 103. One course. *Staff*

149S. Problem Solving Seminar. (QR) Techniques for attacking and solving challenging mathematics problems and writing mathematical proofs. Course may be repeated. Consent of instructor required. Half course. *Staff*

150. Topics in Mathematics from a Historical Perspective. (QR) Content of course determined by instructor. Prerequisite: Mathematics 139 or 203 or consent of instructor. One course. *Staff*

150S. Topics in Mathematics from a Historical Perspective. (QR) Same as Mathematics 150, but offered as a seminar. One course. *Staff*

160. Mathematical Numerical Analysis. (QR) Zeros of functions; polynomial interpolation and splines; numerical integration and differentiation; applications to ordinary differential equations; numerical linear algebra; error analysis; extrapolation and acceleration. Not open to students who have had Computer Science 121 or 221. Satisfies the prerequisite for Computer Science 222 and 223. Prerequisites: Mathematics 103 and 104 and knowledge of an algorithmic programming language, or consent of instructor. One course. *Staff*

160S. Mathematical Numerical Analysis. (QR) Same as Mathematics 160, but offered as a seminar. One course. *Staff*

181. Complex Analysis. (QR) Complex numbers, analytic functions, complex integration, Taylor and Laurent series, theory of residues, argument maximum principles, conformal mapping. Not open to students who have had Mathematics 114 or 231. Prerequisite: Mathematics 139 or 203. One course. *Staff*

187. Introduction to Mathematical Logic. (QR) Propositional calculus; predicate calculus. Gödel completeness theorem, applications of number theory, incompleteness theorem, additional topics in proof theory or computability; contributions of Aristotle, Boole, Frege, Hilbert, and Gödel. Prerequisites: Mathematics 103 and 104 or Philosophy 103. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Admission by consent of instructor and director of undergraduate studies. One course each. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. One course each. *Staff*

196S. Seminar in Mathematical Model Building. (QR) Real models, mathematical models, axiom systems as used in model building, deterministic and stochastic models, linear optimization, competition, graphs and networks, growth processes, evaluation of models. Term project: model of a nonmathematical problem. Prerequisites: Mathematics 103 and 104. One course. *Staff*

197S. Seminar in Mathematics. (QR) Intended primarily for juniors and seniors majoring in mathematics. Topics vary. Prerequisites: Mathematics 103 and 104. One course. *Staff*

198S, 199S. Honors Seminar in Mathematics. (QR) Topics vary. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

For Seniors and Graduates

200. Introduction to Algebraic Structures I. (QR) Laws of composition, groups, rings; isomorphism theorems; axiomatic treatment of natural numbers; polynomial

rings; division and Euclidean algorithms. Not open to students who have had Mathematics 121. Prerequisite: Mathematics 104 or equivalent. One course. *Staff*

201. Introduction to Algebraic Structures II. (QR) Vector spaces, matrices and linear transformations, fields, extensions of fields, construction of real numbers. Prerequisites: Mathematics 200, or Mathematics 121 and consent of instructor. One course. *Staff*

203. Basic Analysis I. (QR) Topology of $\mathbb{R}^n$, continuous functions, uniform convergence, compactness, infinite series, theory of differentiation, and integration. Not open to students who have had Mathematics 139. Prerequisite: Mathematics 104. One course. *Staff*

204. Basic Analysis II. (QR) Inverse and implicit function theorems, differential forms, integrals on surfaces, Stokes' theorem. Not open to students who have had Mathematics 140. Prerequisites: Mathematics 203, or Mathematics 139 and consent of instructor. One course. *Staff*

205. Topology. (QR) Elementary topology, surfaces, covering spaces, Euler characteristic, fundamental group, homology theory, exact sequences. Prerequisite: Mathematics 104. One course. *Staff*

206. Differential Geometry. (QR) Geometry of curves and surfaces, the Serret-Frenet frame of a space curve, the Gauss curvature, Cadazzi-Mainardi equations, the Gauss-Bonnet formula. Prerequisite: Mathematics 104. One course. *Staff*

221. Numerical Analysis. (QR) Prerequisites: knowledge of an algorithmic programming language, intermediate calculus including some differential equations, and Mathematics 104. See C-L: Computer Science 250; also C-L: Statistics 273. One course. *Greenside or Rose*

222. Numerical Differential Equations. (QR) Prerequisite: Computer Science 221 or 250. See C-L: Computer Science 252. One course. *Greenside or Rose*

223. Numerical Linear Algebra. (QR) Prerequisite: Computer Science 221 or 250 or equivalent. See C-L: Computer Science 254. One course. *Rose*

230. Mathematical Methods in Physics and Engineering I. (QR) Heat and wave equations, initial and boundary value problems, Fourier series, Fourier transforms, potential theory. Not open to students who have had Mathematics 114. Prerequisites: Mathematics 103 and 104 or equivalents. One course. *Staff*

231. Mathematical Methods in Physics and Engineering II. (QR) Green's functions, partial differential equations in several space dimensions. Complex variables, analytic functions, Cauchy's theorem, residues, contour integrals. Other topics may include method of characteristics, perturbation theory, calculus of variations, or stability of equilibria. Prerequisite: Mathematics 114 or 230. One course. *Staff*

233. Asymptotic and Perturbation Methods. (QR) Asymptotic solution of linear and nonlinear ordinary and partial differential equations. Asymptotic evaluation of integrals. Singular perturbation. Boundary layer theory. Multiple scale analysis. Prerequisite: Mathematics 114 or equivalent. One course. *Staff*

238, 239. Topics in Applied Mathematics. (QR) Conceptual basis of applied mathematics, combinatorics, graph theory, game theory, mathematical programming, or numerical solution of ordinary and partial differential equations. Prerequisites: Mathematics 103 and 104 or equivalents. One course each. *Staff*

240. Applied Stochastic Processes. (QR) An introduction to stochastic processes without measure theory. Topics selected from: Markov chains in discrete and continuous time, queueing theory, branching processes, martingales, Brownian motion, stochastic

calculus. Prerequisite: Mathematics 135 or equivalent. C-L: Statistics 253. One course. *Staff*

241. Linear Models. (QR) Prerequisites: Mathematics 104 and Statistics 113 or 210. See C-L: Statistics 244. One course. *Staff*

242. Introduction to Multivariate Statistics. (QR) Prerequisite: Statistics 244 or equivalent. See C-L: Statistics 245. One course. *Burdick*

245. Functional Analysis for Scientific Computing. (QR) Prerequisite: Computer Science 221 or 250. See C-L: Computer Science 256. One course. *Rose*

260. Groups, Rings, and Fields. (QR) Groups including nilpotent and solvable groups, p -groups and Sylow theorems; rings and modules including classification of modules over a PID and applications to linear algebra; fields including extensions and Galois theory. Prerequisite: Mathematics 201 or equivalent. One course. *Staff*

261. Commutative Algebra. (QR) Extension and contraction of ideals, modules of fractions, primary decomposition, integral dependence, chain conditions, affine algebraic varieties, Dedekind domains, completions. Prerequisite: Mathematics 260 or equivalent. One course. *Staff*

271. Algebraic Topology. (QR) Fundamental group and covering spaces, homology groups of cell complexes, classification of compact surfaces, the cohomology ring and Poincaré duality for manifolds. Prerequisites: Mathematics 171S and 200 or equivalents. One course. *Staff*

273. Algebraic Geometry. (QR) Local theory: affine varieties, algebraic and topological theory of singularities. Global theory over the complex numbers: Riemann surfaces, Jacobians, Kähler manifolds, Hodge theory, theorems of Lefschetz and Kodaira. Prerequisite: Mathematics 261 or equivalent. One course. *Staff*

275. Differential Geometry. (QR) Differentiable manifolds, fiber bundles, connections, curvature, characteristic classes, Riemannian geometry including submanifolds and variations of the length integral, complex manifolds, homogeneous spaces. Prerequisites: Mathematics 204 and 260 or equivalents. One course. *Staff*

276. Topics in Differential Geometry. (QR) Lie groups and related topics, Hodge theory, index theory, minimal surfaces, Yang-Mills fields, exterior differential systems, several complex variables. Prerequisite: Mathematics 275 or consent of instructor. One course. *Staff*

277. Topics in Algebraic Geometry. (QR) Projective varieties and the theory of extremal rays, classification of surfaces and higher-dimensional varieties, variation of Hodge structure and moduli problems, schemes and arithmetic varieties, or other advanced topics. Prerequisite: Mathematics 273 or consent of instructor. One course. *Staff*

278, 279. Topics in Topology. (QR) Point set, algebraic, geometric, or differential topology. Consent of instructor required. One course each. *Staff*

281. Real Analysis I. (QR) Measures; Lebesgue integral; L^p spaces; Daniell integral, differentiation theory, product measures. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

282. Real Analysis II. (QR) Metric spaces, fixed point theorems, Baire category theorem, Banach spaces, fundamental theorems of functional analysis, Fourier transform. Prerequisite: Mathematics 281 or equivalent. One course. *Staff*

285. Complex Analysis. (QR) Complex calculus, conformal mapping, Riemann mapping theorem, Riemann surfaces. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

286. Topics in Complex Analysis. (QR) Geometric function theory, function algebras, several complex variables, uniformization, or analytic number theory. Prerequisite: Mathematics 285 or equivalent. One course. *Staff*

290. Probability. (QR) Random variables, independence, expectations, laws of large numbers, central limit theorem, Markoff chains. Prerequisite: Mathematics 281 or equivalent. C-L: Statistics 207. One course. *Staff*

293. Topics in Probability Theory. (QR) Brownian motion, diffusion processes, random walks, and applications to differential equations and mathematical physics. Prerequisite: Mathematics 290 or consent of instructor. C-L: Statistics 297. One course. *Staff*

296. Ordinary Differential Equations. (QR) Existence and uniqueness theorems for nonlinear systems, well-posedness, two-point boundary value problems, phase plane diagrams, stability, dynamical systems, and strange attractors. Prerequisites: Mathematics 104, 111 or 131, and 203 or 139. One course. *Staff*

297. Partial Differential Equations I. (QR) Fundamental solutions of linear partial differential equations, hyperbolic equations, characteristics, Cauchy-Kowalevski theorem, propagation of singularities. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

298. Partial Differential Equations II. (QR) Elliptic boundary value problems, regularity theorems, the diffusion equation, and nonlinear equations. Prerequisite: Mathematics 297 or equivalent. One course. *Staff*

299. Topics in Partial Differential Equations. (QR) Hyperbolic conservation laws, pseudo-differential operators, variational inequalities, theoretical continuum mechanics. Prerequisite: Mathematics 298 or equivalent. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

31X. Introductory Honors Calculus I. (QR)

33, 34. Introductory Calculus with Digital Computation. (QR)

71S. Special Topics in Mathematics: For First- and Second-Year Students. (QR)

72S. Special Topics in Mathematics: For First- and Second-Year Students. (QR)

106. Linear Algebra with Digital Computation. (QR)

140. Advanced Calculus II. (QR)

140S. Advanced Calculus II. (QR)

171S. Elementary Topology. (QR)

234. Mathematics for Quantum Mechanics. (QR)

235. Topics in Mathematical Physics. (QR)

250. Introductory Mathematical Logic. (QR)

251. Set Theory I. (QR)

252. Set Theory II. (QR)

253. Recursion Theory

- 258, 259. Topics in Logic. (QR)
- 268. Topics in Algebra. (QR)
- 280. Differential Analysis. (QR)
- 283. Linear Operators. (QR)
- 284. Topics in Functional Analysis. (QR)
- 288, 289. Topics in Analysis. (QR)
- 294. Topics in Probability Theory. (QR)
- 295. Fourier Analysis and Distribution Theory. (QR)

THE MAJOR

The Department of Mathematics offers both the A.B. degree and the B.S. degree. Students who plan to attend graduate school in mathematics or the sciences should consider working toward the B.S. degree, which requires at least eight courses in mathematics numbered above Mathematics 111. The A.B. degree requires at least six and one-half courses numbered above Mathematics 111. The specific requirements for each degree are listed below.

Mathematics 120S is a half-course recommended for prospective mathematics majors who feel the need to improve skills in logical reasoning and theorem-proving before taking Mathematics 121 and 139. Ideally, Mathematics 120S should be taken before the junior year and concurrently with Mathematics 103 or Mathematics 104. Students working toward the A.B. degree who do not take Mathematics 120S will usually fulfill their major requirements by taking at least seven full courses above Mathematics 111.

The director of undergraduate studies can be consulted for additional information and advice on course selection. The *Handbook for Mathematics Majors*, published by the department, can be used as a guide for majors in developing a coherent program of study consistent with their professional goals.

For the A.B. Degree

Prerequisites. Mathematics 103 and 104 or the equivalent. (Many upper-level mathematics courses assume programming experience at the level of Computer Science 1. Students without computer experience are encouraged to take Computer Science 4.)

Major Requirements. Six and one-half courses in mathematics numbered above 111 including Mathematics 121 or 200 and Mathematics 139 or 203.

For the B.S. Degree

Prerequisites. Mathematics 103 and 104 or the equivalent. (Many upper-level mathematics courses assume programming experience at the level of Computer Science 1. Students without computer experience are encouraged to take Computer Science 4.)

Major Requirements. Eight courses in mathematics numbered above 111 including: Mathematics 121 or 200; Mathematics 139 or 203; and one of Mathematics 136, 181, 204, 205. Also, Physics 41L, 42L or Physics 51L, 52L or Physics 53L, 54L.

Honors/Distinction

The department offers a program for Latin honors by honors project. See the section on honors in this bulletin and also the *Handbook for Majors*.

Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates

Qualified students in arts and sciences may select courses from the following offered by the graduate departments associated with the School of Medicine. A major is not offered to undergraduates in any of the departments listed below; nor do the courses count toward area of knowledge requirements. For permission to register for these courses and for further information, see Professors Greenleaf (biochemistry), Padilla (cell biology), Dawson (immunology), Pickup (microbiology), W. C. Hall (neurobiology), Salvesen (pathology), or Schwartz (pharmacology). The 200-level courses below are described in the *Bulletin of Duke University: Graduate School*.

BIOCHEMISTRY (BCH)

- 209, 210. Independent Study. One or two courses. *Staff*
219. Molecular and Cellular Bases of Differentiation. C-L: Cell Biology 219, Immunology 219, Microbiology 219, and Pathology 219. One course. *Counce and staff*
222. Structure of Biological Macromolecules. Half course. *Richardson*
227. Introductory Biochemistry I. Prerequisite: organic chemistry. One course. *Greenleaf, Hill, and Rajagopalan*
228. Introductory Biochemistry II. Prerequisites: organic chemistry and Biochemistry 227. One course. *Fridovich and Webster*
259. Molecular Biology I: Proteins and Enzymes. Prerequisites: biochemistry, organic chemistry, and physical chemistry. C-L: Cell Biology 259, The University Program in Cell and Molecular Biology, Immunology 259, and Microbiology 259. One course. *Fierke and staff*
265S, 266S. Seminar. Topics and instructors announced each semester. Half course or variable. *Staff*
268. Nucleic Acids. Prerequisites: introductory biochemistry and equivalents of Biochemistry 259, Cell and Molecular Biology 247, Cell and Molecular Biology 277, and Cell and Molecular Biology 278. C-L: Cell Biology 268, The University Program in Cell and Molecular Biology, Immunology 268, Microbiology 268, and the University Program in Genetics. One course. *Steege and staff*
291. Physical Biochemistry. Prerequisites: undergraduate physical chemistry and one year of calculus. One course. *Oas and staff*

Courses Currently Unscheduled

- 245L. Macromolecules, Ecology, and Evolution
276L. Comparative and Evolutionary Biochemistry

CELL BIOLOGY (CBI)

- All courses require the consent of the director of undergraduate studies.
202. Medical Physiology. Limited to students whose training requires knowledge of human physiology as it pertains to medicine. Four lectures, one conference, and one clinical correlation per week. Open to undergraduates only with consent of course leader. Students may take either 202 or 203-204, but not both, for credit. One course. *N. Anderson and staff*
203. Introduction to Physiology. Consent of instructor required. Students may take either 202 or 203-204, but not both, for credit. One course. *Blum and staff*
204. Cell and Molecular Physiology. (Continuation of 203.) Prerequisite: consent of instructor. One course. *Mandel and staff*
205. Design and Analysis of Biological Experiments. One course. *Lobaugh*
208. Cellular Neurobiology. Consent of instructor required. C-L: Neurobiology 208. *Augustine, Kauer, and Wong*
210. Independent Study. Variable credit. *Staff*
211. Cellular Mechanisms of Injury. Prerequisite: consent of instructor. One course. *LeFurgey*
212. Topics in Reproductive Biology. Prerequisite: Cell Biology 269 or equivalent. *N. Anderson, Saling, Schomberg, and Tyrey*
213. Oxygen and Physiological Function. Half course. *Jöbsis*
215. Seminar in the Physiology of Disease. Half course. *Mandel and guest faculty*
219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Immunology 219, Microbiology 219, and Pathology 219. One course. *Counce and staff*
223. Cellular and Integrative Cardiovascular Physiology and Biophysics. Consent of instructor required. Prerequisites: Cell Biology 203 or equivalent and Physics 52L or equivalent. C-L: Biomedical Engineering 223. One course. *Benjamin and staff*
232. Extracellular Matrix and Cell Adhesion. Half course. *Bennett and Erickson*
235, 235L. Advanced Research Training in Marine Molecular Biology and Biotechnology. Offered at Beaufort. One course, one and one half courses respectively. *C. Bonaventura and staff*
236S. Seminar on the Cellular and Molecular Biology of Skeletal Muscle. One course. *Schachat*

237. Analytical Imaging in Biomedical Research. One course. *Ingram, Kopf, and LeFurgey*
243. Environmental Biochemistry. Given at Beaufort. Prerequisite: organic chemistry. C-L: Environment 243. One course. *Bonaventura and Brouwer*
244. Cellular and Molecular Research Techniques. Given at Beaufort. Prerequisite: organic chemistry. C-L: Environment 244. One course. *Bonaventura and Brouwer*
259. Molecular Biology I: Proteins and Enzymes. Prerequisite: consent of instructor. C-L: Biochemistry 259, Immunology 259, and Microbiology 259. One course. *Richardson and staff*
268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Cell Biology 259 or consent of instructor. C-L: Biochemistry 268, Immunology 268, Microbiology 268, and the University Program in Genetics. One course. *Steege and staff*
269. Advanced Cell Biology. C-L: Biology 269. One course. *Nicklas and staff*
- 270S. Molecular and Cellular Adaptations of Marine Organisms. Given at Beaufort. Half course. C. *Bonaventura*

Courses Currently Unscheduled

217. Membrane Transport

IMMUNOLOGY (IMM)

214. Fundamentals of Electron Microscopy. Prerequisites: introductory biology and consent of instructor. C-L: Microbiology 214. One course. *Müller*
219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Cell Biology 219, Microbiology 219, and Pathology 219. One course. *Counce and staff*
244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Biology 160 and Chemistry 152L and consent of instructor. C-L: Biology 244. One course. *Kostyu, McClay, and staff*
- 246S. Parasitic Diseases. Prerequisites: Immunology 244 or 291, and Biochemistry 227 or equivalent. C-L: Microbiology 246S. One course. *Balber*
259. Molecular Biology I: Proteins and Enzymes. C-L: Biochemistry 259, Cell Biology 259, Microbiology 259, and the University Program in Cell and Molecular Biology 259. One course. *Richardson and staff*
268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Biochemistry 268, Cell Biology 268, Microbiology 268, the University Program in Cell and Molecular Biology and the University Program in Genetics. One course. *Steege and staff*
269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Biology 269, Cell Biology 269, Microbiology 269, and the University Program in Cell and Molecular Biology 269. One course. *McClay and staff*

MICROBIOLOGY (MIC)

- 209, 210. Independent Study. A laboratory or library project. Prerequisite: consent of director of undergraduate studies and instructor. Credit to be arranged. *Staff*
214. Fundamentals of Electron Microscopy. Prerequisites: introductory biology and consent of instructor. One course. *Müller*
219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Cell Biology 219, Immunology 219, and Pathology 219. One course. *Counce and staff*
- 221, 221L. Medical Microbiology. Prerequisite: consent of instructor. One course, one and one half courses respectively. *Mitchell and staff*
259. Molecular Biology I: Proteins and Enzymes. C-L: Biochemistry 259, Cell Biology 259, and Immunology 259. One course. *Richardson and staff*
268. Nucleic Acids. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Biochemistry 268, Cell Biology 268, Immunology 268, and the University Program in Genetics. One course. *Steege and staff*

Courses Currently Unscheduled

- 246S. Parasitic Diseases

NEUROBIOLOGY (NBI)

- 49S. Perception, Cognition, and Memory. Open to first-year students only. C-L: Psychology 49S. One course. *Purves*
- 189S. Building the Brain. Open only to juniors and seniors. See C-L: Distinguished Professor Course 189S; also C-L: Human Development, Neurosciences, and Psychology 189S. One course. *Purves*
208. Cellular Neurobiology. Consent of instructor required. C-L: Cell Biology 208. One course. *Augustine, Kauer, Lo, and Reinhart*
209. Systems Neurobiology. Prerequisite: consent of instructor. One course. *Cant, Fitzpatrick, Mooney, and Nicolais*
211. Developmental Neurobiology. Consent of instructor required. One course. *Katz and Purves*

212. Molecular Neurobiology. Consent of instructor required. One course. *La Mantia, Lo, Matthew, and Skene*

PATHOLOGY (PTH)

All courses require consent of instructor and director of graduate studies.

209, 210. Independent study. Prerequisite: senior standing. Credit to be arranged. *Staff*

219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Cell Biology 219, Immunology 219, and Microbiology 219. One course. *Counce and staff*

258. Cellular and Subcellular Pathology. Half course. *Shelburne and Sommer*

275. Fundamentals of Electron Microscopy and Biological Microanalysis. One course. *Brody, Ingram, Shelburne, and Sommer*

PHARMACOLOGY (PHR)

150. Pharmacology: Drug Actions and Reactions. Mechanisms of drug action, concepts of drug toxicity, resistance, tolerance and drug interactions. Examples of how drugs affect the autonomic and central nervous systems, the cardiovascular and endocrine systems, and how drugs treat infection and cancer. This course is designed for both science and nonscience majors, but preference will be given to junior biology majors concentrating in pharmacology. Prerequisites: introductory biology (Biology 21L, 22L) and chemistry (Chemistry 11L, 12L). One course. *Schwartz*

160. Drugs, Brain, and Behavior. Mechanisms by which psychoactive drugs act. Changes which occur with chronic use of drugs; drug abuse and dependence. Social and legal implications of psychoactive drugs. This course is designed for both science and nonscience majors. Prerequisites: introductory biology (Biology 21L, 22L) and chemistry (Chemistry 11L, 12L). C-L: Psychology 127. One course. *Kuhn*

191, 192. Independent Study. For juniors and seniors with consent of director of undergraduate studies and supervising instructor. Variable credit. *Staff*

233. Essentials of Pharmacology. Prerequisites: introductory biology; Chemistry 151L; Mathematics 31, 32, and consent of instructor. One course. *Slotkin and staff*

254. Mammalian Toxicology. Prerequisites: introductory biology and Chemistry 151L, or consent of instructor. One course. *Abou-Donia and staff*

Medieval and Renaissance Studies Program (MED)

Professor Witt, *Chair*; Assistant Professor Rasmussen, *Director of Undergraduate Studies*

A major is available in this program.

The program in Medieval and Renaissance Studies is designed to provide the student with a well-rounded understanding of the historical, cultural, and social forces that shaped the medieval and Renaissance periods. The program is divided into four areas of study: fine arts (art and musicology); history; language and literature (English, French, German, Greek, Italian, Latin, and Spanish); and philosophy-religion. An interdisciplinary major is offered. See the section on the major below.

MEDIEVAL AND RENAISSANCE COURSES

21S. First-Year Seminar: Topics in Medieval Studies. Topics vary according to instructor: perspectives from history, literature, religion, philosophy, and the arts. One course. *Staff*

22S. First-Year Seminar: Topics in Renaissance Studies. Topics vary according to instructor: perspectives from history, literature, religion, philosophy, and the arts. One course. *Staff*

114. Aspects of Medieval Culture. (CZ) A study of historical, literary, philosophical, and art historical materials introducing medieval culture and the methods developed for its study. C-L: Classical Studies 139 and History 116. One course. *Aers, Solterer, or Witt*

115. Aspects of Renaissance Culture. (CZ) A study of historical, literary, philosophical, and art historical materials introducing Renaissance culture and the methods developed for its study. C-L: Art 149 and History 148. One course. *Rasmussen, Van Miegroet, and Witt*

160S. Topics in Medieval and Renaissance Studies. Interdisciplinary perspectives from the arts, history, literature, philosophy, and religion. For juniors and seniors and

medieval and Renaissance studies majors, or with consent of instructor. Prerequisite: one course in medieval and/or Renaissance periods. One course. *Staff*

200S. Seminar in Medieval and Renaissance Studies. (CZ) Topics in the historiography and interpretation of medieval and Renaissance culture. Topics will vary from year to year. One course. *Staff*

OTHER COURSES AVAILABLE IN THE PROGRAM AND DESCRIBED UNDER THE LISTINGS OF THE DEPARTMENTS SPECIFIED BELOW

Art and Art History

- 129. The History of Prints and Printmaking. *Rice*
- 131. Art of the Early Middle Ages. *Tronzo or Wharton*
- 134. Topics in Medieval Art and Architecture. *Tronzo*
- 140. Topics in Renaissance Art. *Rice*
- 141. Fifteenth-Century Italian Art. *Rice*
- 142. Sixteenth-Century Italian Art. *Rice*
- 145. Renaissance Art in Florence. *Rice*
- 146. Italian Renaissance Architecture. *Rice*
- 148. Art of the Netherlands in the Fifteenth Century. *Van Miegroet*
- 150/250. Italian Baroque Architecture. *Rice*
- 152. Art of the Netherlands in the Sixteenth Century. *Van Miegroet*
- 153. Art of the Northern Netherlands in the Seventeenth Century. *Van Miegroet*
- 154. German Art in the Fifteenth and Sixteenth Centuries. *Van Miegroet*
- 156. Art of the Southern Netherlands in the Seventeenth Century. *Van Miegroet*
- 216. The Art of the Counter-Reformation. *Rice*
- 233S. Topics in Early Christian and Byzantine Art. *Wharton*
- 236S. Topics in Romanesque and Gothic Art and Architecture. *Staff*
- 243S. Topics in Netherlandish and German Art. *Van Miegroet*
- 247S. Topics in Italian Renaissance Art. *Rice*
- 260S. Topics in Italian Baroque Art. *Rice*

Classical Studies

- 117. Ancient Myth in Literature. *Newton*

Distinguished Professor Courses

- 190S. The Pagan World of the Divine Comedy. *Clay*

English

- 113A. Introduction to Old English. *Staff*
- 113B. Old English Literature. *Staff*
- 121. Medieval English Literature to 1500. *Aers*
- 122. Sixteenth-Century English Literature. *DeNeef, Fish, Randall, or Schwartz*
- 123. English Literature: 1600 to 1660. *DeNeef, Fish, Randall, or Schwartz*
- 140, 141. Chaucer. *Aers*
- 143, 144. Shakespeare. *DeNeef, Gopen, Jones, Porter, Randall, or Valbuena*
- 145. Milton. *Fish, Price, or Schwartz*
- 207A. Introduction to Old English. *Staff*
- 207B. Old English Literature. *Staff*
- 208. History of the English Language. *Butters or J. Tetel*
- 212. Middle English Literature: 1100 to 1500. *Aers*
- 213, 214. Chaucer. *Aers*
- 221. Renaissance Prose and Poetry: 1500 to 1660. *DeNeef, Fish, Randall, or Schwartz*
- 225. Renaissance Drama: 1500 to 1642. *Randall*

French

- 145S. Topics in Renaissance Literature and Culture. *M. Tetel*
- 146S. Montaigne and Self-Portraiture. *M. Tetel*
- 148. French Drama of the Seventeenth Century. *Longino*
- 211. History of the French Language. *Thomas*

German

- 164S. Medieval German Literature (in English translation). *Rasmussen*
- 165S. The Vikings and Their Literature. *Rasmussen*
- 201. Introduction to Middle High German. *Rasmussen*
- 202S. Medieval Seminar. *Rasmussen*
- 203S. Sex, Gender, and Love in Middle High German Literature. *Rasmussen*
- 210S. Renaissance and Reformation. *Borchardt*

- 215S. German Baroque Literature. *Borchardt*
 260. History of the German Language. *Rasmussen*

History

- 107A, 107B. History of England. *Cell or Herrup*
 117. Early Modern Europe. *Neuschel*
 133. Medieval Europe, 300-1400. *Peyrous or Shatzmüller*
 138. Renaissance and Reformation Germany. *Robisheaux*
 151A. The Intellectual Life of Europe, 1250-1600. *Witt*
 173. History of Spain from Late Medieval Times to the Present. *TePaske*
 174A. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
 195S.13, 196S.13. Problems in Early Modern English History. *Herrup*
 195S.37. Before Columbus: Western Views of the Non-Western World. *Green*
 195S.52. Issues in Medieval History. *Staff*
 196S.11. Medieval Universities and Their Students. *Shatzmüller*
 196S.41. Women in Medieval Society. *Green*
 221. Topics in the Social and Economic History of Europe, 1200-1700. *Staff*
 222. Problems in the Intellectual History of the European Renaissance and Reformation. *Witt*
 237S. Europe in the Early Middle Ages. *Staff*
 238S. Europe in the High Middle Ages. *Staff*
 267S. England in the Sixteenth Century. *Herrup*
 268S. England in the Seventeenth Century. *Herrup*

Italian

101. Introduction to Italian Literature. *Caserta or Finucci*
 145S. Topics in Renaissance Literature and Culture. *Finucci*
 284, 285. Dante. *Caserta*

Latin

221. Medieval Latin. *Newton*
 Students interested in Latin paleography should consult the director of undergraduate studies in the program.

Music

- 155S. Music History I: Antiquity, Middle Ages, Early Renaissance. *Brothers*
 156S. Music History II: Late Renaissance, Baroque. *Bartlet, Brothers, Meniker, or Silbiger*
 211. Notation. *Brothers or Williams*
 222. Music in the Middle Ages. *Brothers*
 223. Music in the Renaissance. *Brothers or Silbiger*
 228-229. Collegium Musicum. *Brothers and Meniker*

Philosophy

119. Medieval Philosophy. *Mahoney*
 120. Late Medieval and Renaissance Philosophy. *Mahoney*
 218S. Medieval Philosophy. *Mahoney*
 219S. Late Medieval and Renaissance Philosophy. *Mahoney*

Religion

134. Jewish Mysticism. *Bland*
 162. Introduction to Islamic Civilization. *Lawrence and staff*

Spanish

151. Spanish Literature of the Renaissance and the Baroque. *Staff*
 210. History of the Spanish Language. *Garci-Gómez*

THE MAJOR

A major consists of at least eight courses drawn from the non-introductory courses of the four areas of study (art history, history, language and literature, and philosophy-religion). Three courses in each of two areas must be included. Besides the courses specifically listed (under Medieval and Renaissance Courses and departmental headings) in the medieval and Renaissance periods, provision may be made for independent study in any of the four areas.

Each program is tailored to the needs and interests of the student under the supervision of a committee consisting of faculty members from appropriate departments. After discussion with the director of undergraduate studies for medieval and Renaissance studies, the student submits a provisional program of study outlining

special interdisciplinary interests. Normally the program is planned well before the end of the sophomore year to allow time to acquire a working knowledge of languages pertinent to specific interests.

Microbiology

For courses in Microbiology, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates.

Military Science—Army ROTC (MSC)

Visiting Professor Guild, Lieutenant Colonel, U.S. Army, *Chair*; Visiting Assistant Professor Green, Major, U.S. Army, *Director of Undergraduate Studies and Supervisor of Senior Instruction*; Visiting Assistant Professor Roller, Major, U.S. Army, *Supervisor of Junior Instruction and Commandant of Cadets*; Visiting Assistant Professor Skelton, Captain, U.S. Army, *Supervisor of Sophomore Instruction and Ranger Challenge Coach*; Visiting Assistant Professor Case, Captain, U.S. Army, *Supervisor of Freshman Instruction and Recruiting Operations Officer*

The Department of Military Science offers students from all disciplines within the university the opportunity to study the following subjects: leadership (theory and practice), management (time, personnel, and materiel), ethics and the military profession, the role and responsibility of the military in a democratic society, the philosophy and practice of military law, strategy, and tactics.

The Army ROTC program is made up of a two-year basic course of study (freshman and sophomore level) which is taken without obligation by nonscholarship students, and a two-year advanced course of study (junior and senior level) which includes a six-week advanced camp, usually completed during the summer prior to the senior year. Direct entry into the advanced course is sometimes permitted if an applicant has previous military training or experience, or when a six-week basic camp is completed. To be eligible for participation in the advanced course, students must successfully complete the basic course (unless direct entry is permitted), be physically qualified, be of good moral character, have a minimum of two years remaining as a student (undergraduate or graduate level, or a combination), and sign a contract to accept a commission in the United States Army, the Army National Guard, or the Army Reserve as directed by the Secretary of the Army.

Laboratory is mandatory each semester for scholarship cadets and nonscholarship cadets. Some specific laboratories are required for non-ROTC students taking Military Science 51, 52, and 113. Students should consult the Department of Military Science (telephone 1-919-660-3090 collect, or 1-800-222-9184, toll free) for more detailed information. Also see the Army Reserve Officers' Training Corps section under Special Programs in this bulletin.

1L. Leadership Laboratory. (Fall semester only.) Drill and ceremonies, marksmanship training, land navigation exercises, first aid, small unit tactics, and confidence training. Must be repeated with each fall semester course. No credit. *Roller*

2L. Leadership Laboratory. (Spring semester only.) Drill and ceremonies, communications, and tactical exercises. Must be repeated with each spring semester course. No credit. *Roller*

11. Introduction to ROTC and the Army. The military organization with emphasis on tradition, doctrine, and contribution to national objectives. Laboratory required for Army ROTC cadets. Half course. *Case*

12. The Military Profession. Introduction to the concept of the military as a profession. Questions of ethics and values in the military; the issue of war and morality. Laboratory required for ROTC cadets. Half course. *Case*

51. Military Topography. Interpretation and use of topographical maps to facilitate land navigation. Consideration of the military significance of terrain. Laboratory required for Army ROTC cadets. Half course. *Skelton*

52. Introduction to Small Unit Tactics. Introduction to planning, organizing, and conducting small unit offensive and defensive operations. Consideration of the principles of war. Laboratory required for Army ROTC cadets. Half course. *Skelton*

113. Advanced Military Operations. Fundamentals of the conduct of military operations including advanced military topography; unit movements; route planning; nuclear, biological, and chemical defense; and military communications. Laboratory required for Army ROTC cadets. Prerequisites: Military Science 51 and 52 or ROTC Basic Camp. One course. *Roller*

114. Advanced Tactical Applications. Study of threat forces to include doctrine, organization, equipment, and training. Conduct of platoon offensive, defensive, and patrolling operations for Army infantry units. Laboratory required for Army ROTC cadets. Prerequisite: Military Science 113. One course. *Roller*

151S. Military Justice and Law of War. Introduction to the Uniform Code of Military Justice, selected topics in military law, the law of land warfare, and war and morality. An analysis of the relationship of leadership to these topics. Laboratory required for Army ROTC cadets. One course. *Green*

152. Leadership and Command Management. Theory and practice of leadership and military management techniques for mission accomplishment. Laboratory required for Army ROTC cadets. One course. *Green*

191. Independent Study. Directed readings and research in military science. One course. *Green or Roller*

Music (MUS)

Associate Professor Jaffe, *Chair*; Associate Professor Bartlet, *Director of Undergraduate Studies*; Professors Silbiger, Todd, and Williams; Associate Professor Gilliam; Assistant Professors Brothers, Henry, and Lindroth; Associate Professors of the Practice Dunn, Jeffrey, Parkins, Raimi, and Wynkoop; Assistant Professors of the Practice Bagg, Ku, Love, Muti, Troxler, and Votta; Adjunct Assistant Professor Druessedow; Adjunct Associate Professor of the Practice Jensen; Lecturer Meniker; Staff Associates Crawford, Dimsdale, Eagle, Gilmore, Hanks, Hawkins, Lail, Lile, Mizesko, Pederson, Reed, Schultz, and Tektonidis

A major is available in this department.

For over two thousand years, music has been viewed as a crucial part of education, compulsory in some cultures, optional in many, formative in all. Music is customarily regarded as an art, but as a university subject it has its own scientific language, logic, and grammar, in the understanding of which the mind is stretched and tested. Furthermore, music as taught at Duke includes assumptions that history, theory, composition, and performance are areas of comparable worth both in themselves and as a means of understanding the many facets of musicianship. Almost every student has some personal involvement with music (often with the many kinds of music), and the courses aim to further that involvement, whether passive or active, a simple hobby or a compelling force.

Courses include many kinds of instruction: applied lessons, history and theory lectures and seminars, harmony classes, composition seminars, ensemble participation, practical laboratory work (such as ear-training), coaching sessions for conductors and chamber musicians, and jazz improvisation. Emphasis is placed equally on theory and practice, and students' musical activity can vary widely across the spectrum from composing their own music to endeavoring to understand the technical, historical, and sociological context of other composers' music.

Musical studies can have a particular value in Program II. So many areas of interest in literature (English and world literature), the arts, art history, sociology, politics, philosophy, religion, psychology, and physics are illustrated, paralleled, or elucidated by aspects of music, just as music itself is by those other disciplines.

THEORY, COMPOSITION, AND CONDUCTING

The department's theory courses are designed to give the student a deeper understanding of musical materials: harmony, counterpoint, voice leading, and musicianship. This is accomplished through analysis of repertoire, composition, aural work, and keyboard playing (score reading, figured bass, and simple improvisation).

36. Acoustics and Music. (NS) No previous knowledge of physics is assumed. See C-L: Physics 36. One course. *Lawson*

55. Introduction to Music Theory. (AL) Fundamentals of notation, melodic and harmonic practice, analysis, and score reading, as a basis for independent work. Prerequisite: some ability to read music. One course. *Love, Troxler, or staff*

56. The Songwriter's Vocabulary. (AL) Writing songs in various twentieth-century popular styles. Fundamentals of form, harmony, voice leading, text setting, and production. Prerequisite: Music 55 or consent of instructor. One course. *Staff*

65. Fundamentals of Music Theory. (AL) Physical properties of sound, principles of diatonic tonal organization, melodic and harmonic constructions, elementary counterpoint, and figured bass. Laboratory. Prerequisites: basic knowledge of musical notation and vocabulary. One course. *Lindroth or Parkins*

66. Tonal Harmony. (AL) Harmonic language of eighteenth and nineteenth centuries, functional chromaticism, and introduction to musical forms. Laboratory. Prerequisite: Music 65. One course. *Lindroth*

67S. Composition I. (AL) Composing original music in smaller forms for voice, piano, and other instruments. Studies in compositional techniques. Prerequisites: Music 65 and 66 or consent of instructor. One course. *Jaffe or Lindroth*

68S. Composition II. (AL) See Music 67S. Prerequisites: Music 65 and 66 or consent of instructor. One course. *Jaffe or Lindroth*

75. Jazz Improvisation. (AL) The theory of jazz improvisation for all instruments and its practical application to the different styles of jazz. Consent of instructor required. Half course. *Jeffrey*

116S. Counterpoint. (AL) Polyphonic practice from the sixteenth through the twentieth centuries; sacred and secular music. Laboratory. Prerequisite: Music 66 or consent of instructor. One course. *Jaffe or Williams*

117S. Form, Analysis, and Compositional Techniques. (AL) Analytical studies and compositional exercises in various forms, techniques, and styles with an emphasis on nineteenth- and twentieth-century music. Laboratory. Prerequisite: Music 66 or consent of instructor. One course. *Jaffe or Lindroth*

123. Musicianship I. Development of practical musical skills: sight singing, ear training, and keyboard proficiency. Prerequisite: for music majors, Music 66; for non-majors, consent of instructor. Half course. *Staff*

124. Musicianship II. Prerequisite: Music 123. Half course. *Parkins or staff*

128. Instrumental Conducting. (AL) Development of techniques of conducting instrumental ensembles with emphasis on orchestral repertoire. Score-reading and analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 66 or consent of instructor. One course. *Muti or Votta*

129. Choral Conducting. (AL) Development of techniques of conducting vocal repertoire, ranging from church anthems to large-scale works. Score-reading and analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 66 or consent of instructor. One course. *Wynkoop*

HISTORY, LITERATURE, AND MUSICOLOGY

The study of music history and literature contributes to a broader knowledge of culture and society. Courses offer students the opportunity to examine compositions in their historic and/or social context. In addition to surveying significant forms, genres, and styles, and their development, the courses include consideration of music's function, the place of musicians, aspects of performance practice, and aesthetic value. Although the normal prerequisite for Music 155S-159S (Music History I-III) is Music 65, interested students in other disciplines with some background in music are encouraged to ask individual instructors for permission to enroll.

48S. Music in Contemporary America. (AL) Major topics and trends in music, including the legacy of serialism, minimalism, electronic music, fusion, jazz, musical theater, and film music. Examination of works by leading composers (among them Tower, Reich, and Glass); consideration of music's place in contemporary society as a performing art and entertainment. Open only to students in the FOCUS Program, The Performing Arts in Contemporary America. One course. *Gilliam or Jaffe*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

74. Introduction to Jazz. (AL) A survey examining musical, aesthetic, sociological, and historical aspects. C-L: African and Afro-American Studies 74. One course. *Jeffrey*

119. The Humanities and Music. (AL) Study of music's relationship to the humanities (literature, art, philosophy, cultural and social history) through selected topics. Readings from primary sources, listening to representative pieces of music. C-L: Comparative Area Studies. One course. *Bartlett*

125. Masterworks of Music. (AL) An introduction to the lives and works of major Western composers. One course. *Henry, Muti, Silbiger, Todd, or Votta*

125D. Masterworks of Music. (AL) Same as Music 125 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Gilliam or Votta*

136S. Introduction to World Music. (CZ) Study of music in its cultural context through a survey of selected musical styles from Africa, Asia, and the Americas: musical systems and interrelationships between musicians and their societies. C-L: Comparative Area Studies. One course. *Staff*

141. Special Topics in Jazz. (AL) Topics vary. Also taught as African and Afro-American Studies 141. Prerequisite: Music 74 or consent of instructor. One course. *Brothers or Jeffrey*

142. African-American Music in the Twentieth Century. (AL) A survey including ragtime, blues, jazz, religious music, and the concert tradition. Cultural and social contexts such as commercial influences, race relations, and the Great Migration. C-L: African and Afro-American Studies 142. One course. *Brothers*

143. Beethoven and His Time. (AL) The music of Beethoven and its relation to contemporary historical, social, and literary developments. Emphasis on the nine symphonies. C-L: Comparative Area Studies. One course. *Bartlet, Gilliam, Silbiger, or Todd*

144. Bach and His Time. (AL) The music of Johann Sebastian Bach and its historical and cultural background, with emphasis on the sacred and the instrumental works. Some consideration also given to the music of Bach's contemporaries, including Vivaldi, Rameau, and Handel. C-L: Comparative Area Studies. One course. *Meniker or Silbiger*

145. Mozart and His Time. (AL) A biographical sketch and a study of his works in their relationship to the past and to works of contemporaries in various European countries. C-L: Comparative Area Studies. One course. *Silbiger*

146. Nineteenth-Century German Romanticism in Music. (AL) The principal nineteenth-century figures, including Beethoven, Schubert, the Mendelssohns and Schumanns, Liszt, Wagner, and Brahms. Their eighteenth-century antecedents (C. P. E. Bach, Haydn, Mozart). One course. *Todd*

147. Verdi and Italian Romantic Opera. (AL) The operas of Giuseppe Verdi, from early works closely connected with the Risorgimento to later masterworks like *Otello*, considered in relation to his Italian predecessors and contemporaries. Includes the study of musical scores, dramatic aspects, and literary background, as well as artistic and social conventions. One course. *Muti*

155S. Music History I: To 1650. (AL) The history of music in medieval and early modern Europe in its cultural and social context. Prerequisite: Music 65 or consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Brothers*

156S. Music History IIA: Late Renaissance, Baroque. (AL) Not open to students who have had Music 159S. Prerequisite: Music 65 or consent of instructor. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Bartlet, Brothers, Meniker, or Silbiger*

157S. Music History IIB: Rococo and Classic. (AL) Not open to students who have had Music 159S. Prerequisite: Music 65 or consent of instructor. C-L: Comparative Area Studies. One course. *Bartlet, Silbiger, or Todd*

158S. Music History III: After 1850. (AL) The history of music in Europe and the United States in its cultural and social context. Prerequisite: Music 65 or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

159S. Music History II: From 1650 to 1850. (AL) The history of music in Europe in its cultural and social context. Not open to students who have had Music 156S or Music 157S. Prerequisite: Music 65 or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

166. Opera. (AL) History of opera from the late sixteenth century to the present. Relationship of music and text; opera as social commentary; changing forms and styles. Selected composers, especially Mozart, Verdi, Puccini, and Wagner. One course. *Bartlet or Muti*

167. Symphonic Literature. (AL) An investigation of the symphony, tone poem, and symphonic suite from seventeenth-century antecedents to the orchestral repertoire of the present century. One course. *Henry*

168. Piano Music. (AL) The two-hundred-year tradition of music for the piano, the evolution of the instrument, and its principal composers (including Mozart, Beethoven, Chopin, Liszt, Brahms, and other major figures up to the present day). Performance traditions, the role of virtuosity, and improvisation. One course. *Todd*

169. Hollywood Film Music. (AL) Film scores from the 1930s to the present. Technical, structural, and aesthetic issues, as well as the problem of musical style. C-L: Film and Video. One course. *Gilliam*

185S, 186S. Seminar in Music. (AL) Primarily for junior and senior music majors. Topics to be announced. Consent of instructor required. One course each. *Staff*

187S, 188S. Seminar on Interpretation and Performance. (AL) Interpretative analysis of instrumental (piano, strings, winds) and vocal repertoire from baroque to modern composers. Participants expected to perform. Consent of instructor required. One course each. *Troxler, Votta, or staff*

189S, 190S. Seminar in Music History. (AL) Primarily for junior and senior music majors. Topics to be announced. Prerequisites: Music 155S, 158S, and 159S. One course each. *Staff*

For Advanced Undergraduates and Graduates

201. Introduction to Musicology. (AL) Methods of research on music and its history, including studies of musical and literary sources, iconography, performance practice, ethnomusicology, and historical analysis, with special attention to the interrelationships of these approaches. One course. *Druesedow*

203. Proseminar in Performance Practice. (AL) Critical methods in the study of historical performance practice, including the evaluation of evidence provided by musical and theoretical sources, archival and iconographic materials, instruments, and sound recordings. Current issues regarding the performance practice for music from the Middle Ages to the twentieth century. One course. *Meniker or Silbiger*

211, 212. Notation. (AL) Development and changing function of musical notation from c. 900 to c. 1900, including plainchant notations, black notations, white notations, the invention of printing (particularly movable type and engraving), keyboard and lute tablatures, scores. One course each. *Brothers or Williams*

213. Theories and Notation of Contemporary Music. (AL) The diverse languages of contemporary music and their roots in the early twentieth century, with emphasis on the problems and continuity of musical language. Recent composers and their stylistic progenitors: for example Ligeti, Bartók, and Berg; Carter, Schoenberg, Ives, and Copland; Crumb, Messiaen, and Webern; Cage, Varèse, Cowell, and Stockhausen. One course. *Jaffe or Lindroth*

215. Music Analysis. (AL) Historical, philosophical, and ideological issues raised by music analysis. Intensive study of harmony and voice leading in the works of major tonal composers, with emphasis on the analytic approach of Heinrich Schenker. One course. *Silbiger or Todd*

217. Selected Topics in Analysis. (AL) An exploration of analytical approaches appropriate to a diversity of music, which may include settings of literary texts, pre-tonal music, and music in oral and vernacular traditions. Prerequisite: Music 215 or consent of instructor. One course. *Silbiger*

218. Advanced Counterpoint. (AL) Selected topics in modal or tonal contrapuntal practice with emphasis on music writing up to five parts. Consent of instructor required

for students not registered for doctoral work in composition. One course. *Jaffe, Lindroth, or Williams*

222. Music in the Middle Ages. (AL) Selected topics. C-L: Medieval and Renaissance Studies. One course. *Brothers*

223. Music in the Renaissance. (AL) Selected topics. C-L: Medieval and Renaissance Studies. One course. *Brothers or Silbiger*

224. Music in the Baroque Era. (AL) Selected topics. One course. *Meniker, Silbiger, or Williams*

225. Music in the Classic Era. (AL) Selected topics. One course. *Bartlet or Todd*

226. Music in the Nineteenth Century. (AL) Selected topics. One course. *Bartlet, Gilliam, or Todd*

227. Music in the Twentieth Century. (AL) Selected topics. One course. *Gilliam or Todd*

228-229. Collegium Musicum. An opportunity to study and perform vocal and instrumental music from the Middle Ages to the early romantic period. Weekly rehearsals and one or two concerts each semester. A written project required of all participants. Consent of instructor required for all except graduate students in music. C-L: Medieval and Renaissance Studies. One course. *Meniker*

228A-229A. Collegium Musicum. Same as 228-229, but no project required and no credit awarded. C-L: Medieval and Renaissance Studies. No credit. *Meniker*

230. Workshop in Performance Practice. Laboratory for application of historically informed performance practice on instruments appropriate to the period of the music studied. Emphasizes instrumental and vocal chamber music. Open to graduates and undergraduates with consent of instructor. No credit. *Meniker*

236. Nineteenth-Century Piano Music. (AL) Beethoven, Schubert, Weber, Mendelssohn, Schumann, Chopin, Liszt, and Brahms. The arts of improvisation and transcription, the keyboard virtuoso, the character piece, and the conflict between romantic content and form. One course. *Todd*

295S. Composition Seminar. (AL) Selected topics in composition. One course. *Jaffe or Lindroth*

296S. Analysis of Contemporary Music. (AL) Structures, expressive intentions, and functions since 1914. Contemporary orchestral music, American music, European music, popular media, musical tradition, and contemporary composers. Analysis of works performed in the department's Encounters Series with occasional guest composers present. One course. *Jaffe or Lindroth*

297, 298, 299. Composition. (AL) Weekly independent study sessions at an advanced level with a member of the graduate faculty in composition. One course each. *Jaffe or Lindroth*

INDEPENDENT STUDY

Admission to these courses will be subject to the approval of the director of undergraduate studies and the instructor. The instructor and course content will be established in accordance with the individual student's interests and capacities.

177, 178. Independent Study in Conducting. Advanced work in reading scores, analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 128 or 129 or consent of instructor. One course each. *Muti, Votta, or Wynkoop*

179, 180. Independent Study in Musical Performance.* Open only to sophomores possessing an exceptional technical and interpretative command of a musical medium. Requires either a half-length recital at the end of each semester of study or a full-length recital at the end of the second semester. In the latter case, a brief performance before a jury of music department faculty is required at the end of the first semester. Prerequisites: previous registration in private instruction in applied music at Duke, audition, and consent of instructor. One course each. *Staff*

181, 182. Independent Study in Musical Performance.* Same as 179, 180, but for juniors. One course each. *Staff*

183, 184. Independent Study in Musical Performance.* Same as 179, 180, but for seniors. One course each. *Staff*

191, 192. Independent Study. Directed reading, research, and/or theoretical analysis, culminating in a substantial paper; or exploration of advanced compositional techniques resulting in a work of larger scale. For juniors only. One course each. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. One course each. *Staff*

APPLIED MUSIC

In conjunction with theory and history, performance is an active way of understanding music literature, facing questions of style, and honing one's technical and expressive skills. Provided they qualify by audition, students are encouraged to enroll in private instruction and to participate in ensembles. Auditions must be arranged with the instructor prior to registration. Enrollment in an applied music course does not guarantee permission to enroll in the instructor's class or ensemble the following semester; in some cases another audition may be required. For those students who wish to study privately but do not qualify for university-level instruction, a list of music teachers in the immediate area who are available to Duke students can be obtained from the department office. All applied music courses may be repeated for credit, but no more than two ensembles may be taken concurrently.

57S, 58S. Vocal Diction. 57S: Italian/English; 58S: German/French. For singers, actors, radio announcers, and public speakers. Introduction to the international phonetic alphabet. Students will be required to sing in class. Written, oral, and vocal performance examinations. Half course each. *Lail*

Instruction: half hour

- 79. **Class Applied Music.** Quarter course. *Lail or staff*
- 80. **Piano.** Quarter course. *Crawford, Hawkins, or Love*
- 81. **Strings.** Quarter course. *Bagg, Ku, Lile, Raimi, or Reed*
- 82. **Woodwinds.** Quarter course. *Gilmore, Jeffrey, Pederson, Schultz, or Troxler*
- 83. **Brass.** Quarter course. *Dimsdale, Eagle, or Mizesko*
- 84. **Percussion.** Quarter course. *Hanks*
- 85. **Voice.** Quarter course. *Dunn, Jensen, Lail, or Tektonidis*
- 86. **Organ.** Quarter course. *Parkins*
- 87. **Harpsichord.** Quarter course. *Meniker*

Instruction: 1 hour

- 90. **Piano.** Half course. *Crawford, Hawkins, or Love*
- 91. **Strings.** Half course. *Bagg, Ku, Lile, Raimi, or Reed*
- 92. **Woodwinds.** Half course. *Gilmore, Jeffrey, Pederson, Schultz, or Troxler*

*The schedule of fees for private lessons is applicable to courses 179, 180, 181, 182, 183, 184 (see subsection on fees.)

- 93. Brass. Half course. *Dimsdale, Eagle, or Mizesko*
- 94. Percussion. Half course. *Hanks*
- 95. Voice. Half course. *Dunn, Jensen, Laïl, or Tektonidis*
- 96. Organ. Half course. *Parkins*
- 97. Harpeichord. Half course. *Menüker*

Ensemble Classes: pass/fail

- 100. Symphony Orchestra. Quarter course. *Muti*
- 101. Wind Symphony. Quarter course. *Votta*
- 102. Marching Band. Quarter course. *Boumpani*
- 103. Jazz Ensemble. Quarter course. *Jeffrey*
- 104. Small Jazz Ensemble. Quarter course. *Jeffrey*
- 106. Chamber Music. Quarter course. *Hawkins*
- 111. Opera Workshop. Quarter course. *Laïl*
- 112. Chapel Choir. Quarter course. *Wynkoop*
- 113. Chorale. Quarter course. *Wynkoop*

Credit in Applied Music. (Skills courses—credit not applicable to area of knowledge requirements.) Credit for instruction in courses below 100 is granted on the basis of a half course per semester for one hour of private instruction per week and a minimum of six hours practice weekly; or a half course per year for one half hour of private instruction or one period of class study and a minimum of six hours practice per week. An additional weekly class meeting for performance and criticism may be required by the instructor without additional credit.

Fees. Applied music instruction in one medium (instrument or voice) is offered free to music majors. There is a fee for additional instruction for music majors and all instruction for nonmajors. For specific information on those fees (for one-hour and half-hour private lessons and half-hour class lessons) consult the Office of the Bursar.

Fees are not refundable after the final drop/add day.

No charge is made for practice room facilities for students registered for private or class lessons in applied music. A fee schedule for the use of facilities by others not registered for applied lessons is available from the music department office.

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

- 77. Introduction to Chamber Music. (AL)
- 115S. Modal Counterpoint. (AL)
- 120S. Women in Music. (CZ)
- 122. Orchestration. (AL)
- 135S. American Music to 1900. (AL)
- 138. Music in East and Southeast Asia. (AL)
- 139. Twentieth-Century Music. (AL)
- 165. Opera in Vienna. (AL)
- 171S. Bach: Master of Style. (AL)
- 172S. Handel and Bach: Music for Voice. (AL)

THE MAJOR

A major or second major in music is a means of preparing students for further professional training in the branches of the art, for graduate study as historians,

composers, and performers, and for a more intimate understanding of one of life's most important experiences. The music major can also be an attractive pursuit for the well-rounded undergraduate planning a career in another field, such as business, law, or medicine. The aim of the required courses is to give a balanced selection of history, theory, composition, and performance, reinforced by constant attention to the art of listening. With the required courses as their foundation, students choose electives to further their interest in, or gifts for, a particular music activity, so that a performer will have a good theoretical background, a historian considerable experience as a player, a composer various kinds of understanding of music of the past, and so on.

Prerequisites. Music 65, 66, and one year of applied music study in an instrument or voice; two semesters of participation in a departmental ensemble (excluding Music 102), with or without credit.

Major Requirements. Music 116S, 117S, 123 and 124 (two half courses), 155S, 158S, 159S, either 189S or 190S or a 200-level course approved by the director of undergraduate studies, and one additional elective approved by the director of undergraduate studies. For students matriculating before fall 1995, 156S and 157S may replace 159S and either 189S or 190S or an approved 200-level course. Those who plan to study music beyond the undergraduate level are strongly advised to prepare themselves in two or more foreign languages.

Honors/Distinction. Music majors who are qualified (see the section on honors in this bulletin) may undertake work leading to departmental graduation with distinction or Latin honors by honors project. In either case the candidate must make application to the director of undergraduate studies by March 20 of the junior year. The project is normally a year-long endeavor involving an independent study or an appropriate graduate seminar each semester of the senior year. It must culminate in (a) a substantial paper (historical, analytical, or theoretical); or, (b) a full-length recital with a shorter paper or composition; or, (c) a major composition with a shorter paper or half-length recital. The final project must be approved by a faculty committee.

Naval Science—Navy ROTC (NS)

Professor Avery, Captain, U.S. Navy, *Chair*; Visiting Assistant Professor Bowen, Captain, U.S. Marine Corps, *Director of Undergraduate Studies*; Visiting Associate Professor Kaufman, Commander, U.S. Navy; Visiting Assistant Professors Garvey, Lieutenant, U.S. Navy, Iseminger, Lieutenant, U.S. Navy, and Raup, Lieutenant, U.S. Navy

Courses in naval science are open to all students. The program in naval science offers students an opportunity to gain a broad-based knowledge in naval studies leading to a challenging career as a naval or marine corps officer. Since a major is not available in this program, scholarship program participants are encouraged to pursue majors in technical fields, although a major in any field of study leading to a baccalaureate degree meets the basic requirement. The academic program for an approved degree and commission must include all naval science courses and laboratories. Navy option scholarship students must complete one year of calculus by the end of the sophomore year, one year of calculus-based physics by the end of the junior year, one year of American military history or national security policy, one year of English, and one semester of computer science.

Nonscholarship Navy option student requirements are one year of mathematics, one year of physical science, one year of English, and one semester of computer science. Marine Corps option students are required to take one year of American military history or national security policy.

11. Naval Orientation. Organization, missions, and branches of specialization within the United States Navy. Customs, traditions, leadership, and career opportunities. No credit. *Garvey*

- 11L. Naval Orientation Laboratory.** Practical application of the elements and material presented in Naval Science 11. No credit. *Garvey*
- 12. Naval Ships Systems.** Quantitative study of basic naval ships' systems. Focus on propulsion and various auxiliary systems. Ship design, stability, and damage control. One course. *Iseminger*
- 12L. Naval Ships Systems Laboratory.** Practical application of the theories and principles of naval ships systems. No credit. *Iseminger*
- 49S. First-Year Seminar.** Topics vary each semester offered. One course. *Staff*
- 52. Seapower and Maritime Affairs.** The role of seapower in national and foreign policy, and as an instrument of politico-military strategy. Includes comparative study of United States and Soviet maritime strategies. One course. *Garvey*
- 53L. Seapower Laboratory.** Case studies and contemporary issues dealing with United States Navy. Mandatory for Navy ROTC midshipmen. No credit. *Garvey*
- 126. Concepts and Analyses of Naval Tactical Systems.** Detection systems; systems integration into current naval platforms and their offensive and defensive capabilities. One course. *Iseminger*
- 126L. Naval Tactical Systems Laboratory.** Practical application of the theories and principles of naval tactical systems. No credit. *Iseminger*
- 131. Navigation.** Theory, principles, and procedures of ship navigation, movements, and employment. Dead reckoning, piloting, celestial and electronic principles of navigation. Naval Science 131L should be taken concurrently. One course. *Raup*
- 131L. Navigation Laboratory.** Practical application of the theories and principles of navigation as presented in the lecture series. No credit. *Raup*
- 132. Naval Operations.** Components of general naval operations, including concepts and application of tactical formations and dispositions, relative motion, maneuvering board and tactical plots, rules of the road, and naval communications. Naval Science 132L is a concurrent requirement. One course. *Raup*
- 132L. Naval Operations Laboratory.** Practical application of the theories of naval operations as presented in the lecture series. No credit. *Raup*
- 137L, 138L. Marine Tactics Laboratory.** Concepts and applications of tactical employment of marine amphibious forces. Ground weapons systems, land navigation, and small unit tactics. No credit. *Bowen*
- 141S. Evolution of Warfare.** Continuity and change in the history of warfare, with attention to the interrelationship of social, political, technological, and military factors. One course. *Bowen*
- 145L. Naval Leadership and Management I.** Study of organizational behavior and management in the context of naval organization. Topics include discussion of leadership and management functions of planning, controlling, and directing. Practical applications explored using case studies. No credit. *Kaufman*
- 146L. Naval Leadership and Management II.** The study of officer responsibilities in naval administration. Discussions of counseling methods, military justice, human resources management, and supply systems. No credit. *Kaufman*
- 147L, 148L. Marine Leadership Laboratory.** Marine Corps career management, naval correspondence, force structure, leadership techniques, and training. No credit. *Bowen*

151S. Amphibious Operations. Development of amphibious doctrine, with attention to its current applications. One course. *Bowen*

191. Independent Study. Directed reading and research. Open only to qualified students in junior and senior years by consent of director of undergraduate studies. One course. *Staff*

Neurobiology

For courses in Neurobiology, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates

Neurosciences

For courses in neurosciences, see Biology, Psychology, and the Neurosciences Program.

Neurosciences Program

Professor W. G. Hall and Associate Professor Nowicki, *Co-Directors*

The study of the nervous system has developed into one of the most exciting areas of modern science with rapidly expanding knowledge in both basic and medically applied areas. The Neurosciences Program offers the student guidance in planning a liberal arts education in the context of a structured emphasis on study in the neural sciences. The program especially encourages and facilitates undergraduate research participation, through independent study courses, in neuroscience laboratories across the university, including the Medical School—Graduate School Basic Sciences Department of Neurobiology. The program also sponsors special lectures, workshops, and research mini-symposia throughout the academic year designed to foster undergraduate interest in neurobiology.

Students may participate in the Neurosciences Program in one of three ways: (1) as biology majors with a neuroscience concentration in biology, (2) as psychology majors with a neuroscience concentration in psychology, or (3) as majors in other departments, by completing a sequence of required courses for a Neurosciences Program certificate. Two core courses, described below, are required for each of these options. Further, each option specifies a number of neuroscience electives, including independent study research courses, that are to be completed as part of the student's primary major. See Biology and Psychology for descriptions of neuroscience areas of concentration within these majors. Further details on the Neurosciences Program and neuroscience areas of concentration may be obtained from either of the co-directors at the program office.

Core Courses

Psychology 93. Biological Bases of Behavior: Introduction and Survey. Physiological, developmental, and evolutionary approaches to behavior. Sensory and cognitive processes, sleep, pain, emotion, hunger, and thirst as well as maternal and sexual behavior patterns. Students required to participate as subjects in three to six hours of psychological research if not done in a previous introductory class. Prerequisite: Biology 14L, 19, 21L, or 22L; may be taken concurrently. One course. *C. Erickson or staff*

Biology 154. Principles of Neurobiology. Introduction to neuroscience, including basic physiology, microstructure, and anatomy of neural tissues; mechanisms of neuronal development and integration; sensory-motor control; the neural foundations of animal behavior, and the evolution of nervous systems. Prerequisites: Biology 21L, 22L or Biology 14L; and Chemistry 12L or equivalent. C-L: Psychology 135. One course. *Nowicki*

Elective Courses

The following is a partial listing of representative elective courses. For descriptions, consult the listings under specified departments in the undergraduate and graduate bulletins.

Developmental and Comparative Anatomy of Vertebrates. (Biology 108L.) *Staff*
Biochemistry of Marine Animals. (Biology 1155L.) *Rittschof*
Animal Behavior. (Biology 201L, S.) *Klopfer*
Building the Brain. (Distinguished Professor Course 189S, Neurobiology 189S, and Psychology 189S.) *Purves*
Marine Animal Navigation. (Biology 296.22S.) *Forward*
Animal Communication. (Biology 296.22S.) *Nowicki*
Learning and Adaptive Behavior. (Psychology 111.) *Higa*
Behavior and Neurochemistry. (Psychology 126.) *Cooper*
Fundamental Issues in the Study of the Brain. (Psychology 133.) *W. C. Hall*
Psychobiology of Motivation. (Psychology 139.) *Mulvey*
Methods in Behavioral Neurobiology. (Psychology 149S.) *W. G. Hall or Mulvey*
Hormones and Behavior. (Psychology 150S.) *Izard*
Neurobiology of Learning and Memory. (Psychology 165S.) *Swartzwelder*
Independent Study. (Biology 191, 192 and Psychology 191, 192, 193, 194.) *Staff*
Cellular Neurobiology. (Neurobiology 208.) *Augustine, Kauer, Lo, and Reinhart*
Systems Neurobiology. (Neurobiology 209.) *Cant and Fitzpatrick*
Developmental Neurobiology. (Neurobiology 211.) *Katz, LaMantia, and Purves*
Molecular Neurobiology. (Neurobiology 212.) *Matthew and Skene*

Pathology

For courses in pathology, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates.

Pharmacology

For courses in pharmacology, see Medicine (School)—Graduate (School) Basic Science Courses Open to Undergraduates.

Persian

For courses in Persian, see Asian and African Languages and Literature.

Philosophy (PHL)

Professor Flanagan, *Chair*; Professor Mahoney, *Director of Undergraduate Studies*; Professors Brandon, Golding, Joy, MacIntyre, and Sanford; Associate Professors Ferejohn, Posy, Stone (law), and Rapaport (public policy studies); Assistant Professors Cooper, Lind, and Schmaltz; Professors Emeriti Peach and Welsh; Adjunct Associate Professor Ward

A major or a minor is available in this department.

The undergraduate program in the Department of Philosophy acquaints students with the content and the structure of philosophical theory in various areas. Discussion is encouraged so that students can engage actively in the philosophical examination of problems.

Course offerings fall into two general categories: the systematic and the historical. In a systematic treatment, the organization of a course is primarily in terms of the problems presented by the subject matter of that course, as in logic, ethics, and metaphysics. In historical courses, attention is directed more to the order of development in the thought of a particular philosopher (Plato, Aristotle, Kant) or in a historical period. In all courses, reading of the works of philosophers acquaints the students with the important and influential contributions to the definition and solution of philosophical issues.

The problems raised in philosophy in respect to the various fields of the arts and sciences involve questions that are not normally given attention in those particular disciplines. In the consideration of such problems, therefore, it is expected that students

will acquire some understanding and perspective of the major areas of the human intellectual endeavor. In this sense, philosophical comprehension is an essential part of a student's learning and education.

Philosophy provides a sound preparation for the demands of many professions. For example, the precision of argument and broad acquaintance with intellectual traditions emphasized in philosophy form an excellent basis for the study of law. Only one course from among Philosophy 41, 42, 43S, and 44S may be taken for credit. These courses are normally not open to juniors and seniors.

41. Introduction to Philosophy. (CZ) Examination of problems in philosophy; emphasis on metaphysics and theory of knowledge. One course. *Staff*

42. Introduction to Philosophy. (CZ) Examination of problems in philosophy; emphasis on ethics and value theory. One course. *Staff*

43S. Introduction to Philosophy. (CZ) Philosophy 41 conducted as a seminar. One course. *Staff*

44S. Introduction to Philosophy. (CZ) Philosophy 42 conducted as a seminar. One course. *Staff*

48. Logic. (CZ) The conditions of effective thinking and clear communication. Examination of the basic principles of deductive reasoning. One course. *Brandon, Posy, Sanford, or staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

100. History of Ancient Philosophy. (CZ) The pre-Socratics, Socrates, Plato, Aristotle, and post-Aristotelian systems. Not open to students who have taken Classical Studies 93 or Philosophy 93. Prerequisites: for first-year students, previous philosophy course and consent of instructor. C-L: Classical Studies 100. One course. *Ferejohn or Mahoney*

101. History of Modern Philosophy. (CZ) Bacon, Hobbes, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Not open to students who have taken Philosophy 94. Prerequisites: for first-year students, previous philosophy course and consent of instructor. One course. *Joy, Posy, or Schmaltz*

102. Aesthetics: The Philosophy of Art. (CZ) The concept of beauty, the work of art, the function of art, art and society, the analysis of a work of art, criticism in the arts. One course. *Ward*

103. Symbolic Logic. (CZ) Detailed analysis of deduction and of deductive systems. Open to sophomores by consent of instructor. C-L: Linguistics. One course. *Brandon or Posy*

104. Philosophy of Science. (CZ) The principal philosophical and methodological problems in contemporary science. One course. *Brandon or Cooper*

106. Philosophy of Law. (CZ) Natural law theory, legal positivism, legal realism, the relation of law and morality. One course. *Golding*

107. Political and Social Philosophy. (CZ) The fundamental principles of political and social organizations. One course. *Mahoney*

109. Philosophy of Language. (CZ) A philosophical analysis of problems arising in the study of language and symbolism. Topics include: theories of language, the nature of signs and symbols, theories of meaning, types of discourse (scientific, mathematical, poetic), definition, ambiguity, metaphor. C-L: Linguistics. One course. *Posy*

110. Knowledge and Certainty. (CZ) Problems in the theory of knowledge: conditions of knowledge, scepticism, perception, memory, induction, knowledge of other minds, and knowledge of necessary truths. One course. *Ferejohn or Sanford*

111. Appearance and Reality. (CZ) Problems in metaphysics: theories of existence, substance, universals, identity, space, time, causality, determinism and action, and the relation of mind and body. One course. *Ferejohn or Sanford*

112. Philosophy of Mind. (CZ) Such topics as mind and body, the nature of thought, perception, consciousness, personal identity, and other minds. The relevance of cognitive psychology, neuroscience, and computer science to the philosophy of mind. One course. *Flanagan or Sanford*

115. Environmental Ethics. (CZ) Critical investigation of the goals of environmental policy and the values to which these goals give expression. Various "land health" issues such as biodiversity, ecosystem preservation, ecological restoration, agricultural practice, and pollution. One course. *Cooper*

116. Systematic Ethics. (CZ) Problems in moral philosophy: the nature of morality, ethical relativism, egoism, utilitarianism. Both historical and contemporary readings, with emphasis on the latter. One course. *Golding or Lind*

117. Ancient and Modern Ethical Theories. (CZ) The development of ethical thought in the West; the interaction between culture and ethical theory, with special reference to the Greek city-state, Roman law, the Renaissance, the Reformation, and the rise of modern science. Readings in the great ethical philosophers. One course. *Flanagan, Golding, or Lind*

118. Philosophical Issues in Medical Ethics. (CZ) Ethical issues arising in connection with medical practice and research and medical technology. Definition of health and illness; experimentation and consent; genetic counseling and biological engineering; abortion, contraception, and sterilization; death and dying; codes of professional conduct; and the allocation of scarce medical resources. Prerequisites: for freshmen, previous philosophy course and consent of instructor. One course. *Brandon or Golding*

119. Medieval Philosophy. (CZ) Christian, Islamic, and Jewish philosophy from late antiquity to 1300. Special emphasis on historical influences and institutional developments. Nature and destiny of humans, existence and nature of God, problem of ethical norms, political philosophy. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

120. Late Medieval and Renaissance Philosophy. (CZ) Problems of political authority and nature of the state, mysticism, humanism, critical trends, background of Galileo, and impact of the Reformation related to cultural and institutional changes. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

122. Philosophical Issues in Feminism. (CZ) Issues in political and moral philosophy in their bearing on feminist concerns, including political equality and rights, preferential treatment, feminist and non-feminist critiques of pornography, and the morality of abortion. C-L: Women's Studies. One course. *Lind*

123. Aristotle. (CZ) Survey of principal topics in Aristotelian philosophy. Areas of study include metaphysics, epistemology, philosophy of science, philosophy of language, ethics, and political philosophy. C-L: Classical Studies 113. One course. *Ferejohn*

124. Philosophy of Education. (CZ) Alternative models of the educational process and of the relationship between education and moral development. The ideal of the "educated individual": education vs. training. The ideal of liberal learning: its moral context and its presuppositions. The educational process and its institutional settings.

Readings from Plato, Aristotle, Aquinas, Rousseau, Kant, Whitehead, and others. One course. *Ward*

125. Philosophy of Music. (CZ) The nature of music and its place in the arts. Emotion and meaning, creation and interpretation in music. Readings from a wide variety of sources. One course. *Ward*

126. Philosophy of Sport. (CZ) Play, sport, and game in western culture. Sport and leisure. Sport vs. athletics. The discipline of the body. Competition and the urge to win. The concept of the "team" and ideals of individual performance. Spectatorship. The amateur and the professional. One course. *Ward*

130. Philosophy of Religion. (CZ) Selected concepts and doctrines. One course. *Staff*

131. Kant. (CZ) Immanuel Kant's philosophy, its background and influence. His early work in metaphysics and ethics and his mature philosophy of the "Critical Period" in which he wrote *The Critique of Pure Reason*, *The Critique of Practical Reason*, and *The Critique of Judgment*. Prerequisite: Philosophy 101. One course. *Posy*

132. Nineteenth-Century Philosophy. (CZ) Emphasis on Hegel, Marx, and Nietzsche. One course. *Staff*

134. Existentialism. (CZ) Themes and approaches in existential philosophy. Selected writings of Kierkegaard, Tolstoy, Dostoevsky, Heidegger, and Sartre. Contemporary relevance of existentialist perspectives. One course. *Ward*

139. Twentieth-Century Continental Philosophy. (CZ) A critical and historical examination of movements in European philosophy such as existentialism, structuralism, poststructuralism, hermeneutics, and critical theory. Husserl, Heidegger, Sartre, Gadamer, Habermas, and Derrida: their views of language, history, and the problems of modern society. One course. *Staff*

191, 192, 193, 194. Independent Study. Directed reading and research. Open only to highly qualified students in the junior and senior year with consent of the department. One course each. *Staff*

195. Special Topics in Philosophy. One course. *Staff*

196S, 197S, 198S, 199S. Seminars in Philosophy. (CZ) One course each.

For Seniors and Graduates

203S. Contemporary Ethical Theories. (CZ) The nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth-century British and American philosophers. One course. *Flanagan, Golding, or Lind*

204S. Philosophy of Law. (CZ) Natural law theory and positivism; the idea of obligation (legal, political, social, moral); and the relation of law and morality. One course. *Golding*

206S. Responsibility. (CZ) The relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. One course. *Golding*

208S. Political Values. (CZ) Analysis of the systematic justification of political principles and the political values in the administration of law. One course. *Golding*

210. Logic for Computer Science. (QR) See C-L: Computer Science 242. One course. *Loveland*

- 211S. Plato. (CZ)** Selected dialogues. C-L: Classical Studies 211S. One course. *Ferejohn*
- 217S. Aristotle. (CZ)** Selected topics. C-L: Classical Studies 217S. One course. *Ferejohn*
- 218S. Medieval Philosophy. (CZ)** Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*
- 219S. Late Medieval and Renaissance Philosophy. (CZ)** Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*
- 225S. British Empiricism. (CZ)** A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. One course. *Lind or Schmaltz*
- 227S. Continental Rationalism. (CZ)** A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. One course. *Schmaltz*
- 228S. Recent and Contemporary Philosophy. (CZ)** A critical study of some contemporary movements, with special emphasis on analytic philosophers. C-L: Linguistics. One course. *Posy*
- 231S. Kant's Critique of Pure Reason. (CZ)** One course. *Posy*
- 232S. Recent Continental Philosophy.** Selected topics. One course. *Staff*
- 233S. Methodology of the Empirical Sciences. (CZ)** Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, probability and induction, and other topics. Consent of instructor required. One course. *Brandon or Cooper*
- 234S. Problems in the Philosophy of Biology. (NS)** Selected topics, with emphasis on evolutionary biology: the structure of evolutionary theory, adaptation, teleological or teleonomic explanations in biology, reductionism and organicism, the units of selection, and sociobiology. Consent of instructor required. C-L: Biology 234S. One course. *Brandon*
- 235S. Nineteenth-Century German Philosophy. (CZ)** A critical examination of the writings of Hegel, Marx, or Nietzsche. One course. *Staff*
- 240S. Philosophical Psychology. (CZ)** A study of recent work on the nature of the self and the nature and function of consciousness. Work from philosophy, psychology, cognitive neuroscience, and evolutionary biology will be discussed. One course. *Flanagan*
- 250S. Topics in Formal Philosophy. (CZ)** Topics selected from formal logic, philosophy of mathematics, philosophy of logic, or philosophy of language. C-L: Linguistics. One course. *Posy*
- 251S. Epistemology. (CZ)** Selected topics in the theory of knowledge; for example, conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*
- 252S. Metaphysics. (CZ)** Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. One course. *Sanford*
- 253S. Philosophy of Mind. (CZ)** Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons and personal identity. One course. *Sanford*

289S. Environmental Ethics. (CZ) Selected topics involving values and the environment, for example, extending morality to nature, rights of future generations, environmental aesthetics, diversity and stability, ideological biases in ecological knowledge. Consent of instructor required. C-L: Environment 282S. One course. *Cooper*

291S, 292S. Special Fields of Philosophy. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

105. Philosophy of History. (CZ)

108. Social Ideals and Utopias. (CZ)

113. Philosophy of Mathematics. (CZ)

114D. Hellenistic Philosophy. (CZ)

121. Philosophy and Film. (CZ)

135. Philosophy in Literature. (CZ)

138. Analytic Philosophy in the Twentieth Century. (CZ)

202S. Aesthetics: The Philosophy of Art. (CZ)

205S. Philosophy of History. (CZ)

254S. Topics in Philosophy of Religion. (CZ)

THE MAJOR

Major Requirements. Eight courses in philosophy including Philosophy 100 and 101; at least one nonintroductory course in moral, social, political, or legal philosophy, such as Philosophy 106, 107, 108, 116, 117, 118, or 122; and at least one course at the 200 level. In addition, a course in logic is highly recommended.

Honors/Distinction. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

THE MINOR

The minor in philosophy requires at least five courses, no more than two of which may be below the 100 level. No specific courses are required. All students who wish to pursue a minor are encouraged to seek advice from faculty members in the department.

Physics (PHY)

Professor Evans, *Chair*; Professor Walter, *Director of Undergraduate Studies*; Professors Behringer, Bilpuch, Fortney, Goshaw, Han, Johnson, Madey, Meyer, Müller, Palmer, Roberson, Thomas, and Weller; Associate Professors Greenside, Howell, and Oh; Assistant Professors Gauthier, Lee, Litvinenko, O'Shea, Socolar, Springer, and Teitsworth; Professors Emeriti Robinson and Walker; Research Professor Tornow; Research Assistant Professor Phillips; Adjunct Professors Guenther, Iafrate, Rogosa, and Stroschio; Adjunct Associate Professors Lawson and Skatrud; Adjunct Assistant Professors Everitt, Kolena, and Trayanov; Visiting Assistant Professor Brown; Lecturers Haque and Sujatha

A major is available in this department.

Through the study of physics students learn the methods and results of a systematic examination of the objects that make up the natural universe and of their interactions with each other. The knowledge and analytical skills thus obtained are basic to the study of the sciences and engineering. The department offers a number of courses for nonspe-

cialists who wish to learn about the physicist's description of nature for its intrinsic intellectual value.

21, 22. Introductory Physics. Credit for advanced placement on the basis of the College Board Examinations "Physics-C." One course each.

32. Physics from the Historical Perspective. (NS) The historical development of physical theories is traced from early theories of the solar system to relativity and quantum theory. No previous study of physics is assumed, but the student must be able to use simple mathematics through basic algebra. One course. *Staff*

35. Practical Physics. (NS) Fundamental concepts and laws of physics in the context of technological applications. Intended for persons not majoring in science or engineering; no previous knowledge of physics is assumed. The emphasis is on "how things work." One course. *Staff*

36. Acoustics and Music. (NS) The physical principles underlying musical instruments, room acoustics, and the human ear. Analysis, reproduction, and synthesis of musical sounds. No previous knowledge of physics is assumed. C-L: Music 36. One course. *Lawson*

41L, 42L. Fundamentals of Physics. (NS) For students interested in majoring in physics; taken in the freshman year. Basic principles of physics, mainly classical, at a level similar to Physics 51L, 52L, but with emphasis on laying a foundation for further study. Lecture, recitations, and laboratory. Closed to students having credit for Physics 51L, 52L. Prerequisites: consent of director of undergraduate studies; Mathematics 31 and 32 may be taken concurrently. One course each. *Goshaw or Roberson*

51L, 52L. Introductory Technical Physics. (NS) A survey of the principles of classical physics, intended principally for students in the physical sciences and engineering. Students planning a major in physics should enroll instead in Physics 41L, 42L in their freshman year. Physics 51L is closed to students having credit for Physics 41L or Physics 53L; Physics 52L is closed to students having credit for Physics 42L or Physics 54L. Prerequisite: Mathematics 31, 32 or equivalent; Mathematics 32 may be taken concurrently with Physics 51L; for 52L: Physics 51L or 53L. One course each. *Staff*

53L, 54L. General Physics. (NS) A survey of the principles of physics, intended mainly for students planning study in medicine or the life sciences. The level and coverage are similar to that of Physics 51L, 52L, but there are differences in emphasis. Physics 53L is closed to students having credit for Physics 41L or Physics 51L; Physics 54L is closed to students having credit for Physics 42L or Physics 52L. Prerequisite: Mathematics 31, 32 or equivalent; Mathematics 32 may be taken concurrently with Physics 53L; for 54L: Physics 51L or 53L. One course each. *Staff*

55. Introduction to Astronomy. (NS) The evolving theory of the physical universe. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Several observatory sessions. One course. *Everitt*

100. Introduction to Modern Physics. (NS) Survey of modern physics including relativity and the quantum physics of atoms, nuclei, particles, and quarks. Not applicable toward a major in physics. Prerequisites: Physics 42L, 52L, or 54L and Mathematics 103 (may be taken concurrently). One course. *Han*

105. Introduction to Astrophysics. (NS) Basic principles of astronomy treated quantitatively. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Prerequisites: Mathematics 31 and Physics 42L, 52L, 54L or consent of instructor. One course. *Kolena*

143L. Optics and Modern Physics. (NS) Intended as a continuation of Physics 41L, 42L. Classical wave and ray optics. Introduction to quantum physics. Prerequisites: Physics 42L, 52L, or 54L and Mathematics 103 (may be taken concurrently). One course. *Walter*

Physics 42L, 52L, or 54L or equivalent, and Mathematics 103 or equivalent are prerequisites to all of the following courses.

171L. Electronics. (NS) Elements of electronics including circuits, transfer functions, solid-state devices, transistor circuits, operational amplifier applications, digital circuits, and computer interfaces. Lectures and laboratory. One course. *Fortney*

176. Thermal Physics. (NS) Thermal properties of matter treated using the basic concepts of entropy, temperature, chemical potential, partition function and free energy. Topics include the laws of thermodynamics, ideal gases, thermal radiation and electrical noise, heat engines, Fermi-Dirac and Bose-Einstein distributions, semiconductor statistics, kinetic theory, and phase transformations. Prerequisites: Mathematics 103 or equivalent and Physics 51L, 52L or equivalent. C-L: Electrical Engineering 176. One course. *McCumber or Teitsworth*

181. Introductory Mechanics. (NS) Newtonian mechanics at the intermediate level, Lagrangian mechanics, linear oscillations, special relativity. Prerequisite: Mathematics 111 or equivalent (may be taken concurrently). One course. *Gauthier*

182. Electricity and Magnetism. (NS) Electrostatic fields and potentials, boundary value problems, magnetic induction, energy in electromagnetic fields, Maxwell's equations, introduction to electromagnetic radiation. Prerequisite: Mathematics 111 or equivalent. One course. *Evans*

185. Modern Optics I. (NS) Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. Lecture and laboratory projects. C-L: Electrical Engineering 274. One course. *Guenther*

186. Modern Optics II. (NS) Optical processes including nonlinear interactions, optical modulators, advanced laser topics, and spectroscopy. Lecture and laboratory projects. One course. *Guenther*

191, 192. Independent Study. Consent of instructor required. One course each. *Staff*

For Seniors and Graduates

205. Introduction to Nuclear Physics. (NS) Phenomenological aspects of nuclear physics, interaction of gamma radiation and charged particles with matter, nuclear detectors, particle accelerators, radioactivity, basic properties of nuclei, nuclear systematics, nuclear reactions, particle scattering, nuclear models of the deuteron, nuclear forces, parity. One course. *Weller*

211. Fundamentals of Quantum Mechanics. (NS) Waves and particles, Schrödinger equation, Dirac notation and mathematical tools, fundamental postulates, angular momentum and addition of angular momentum, applications to spin systems, harmonic oscillators, and the hydrogen atom. Prerequisites: Mathematics 111 and Physics 181. One course. *Springer*

212. Applications of Quantum Mechanics. (NS) Application of the fundamental postulates to atomic structure and spectra, solid state phenomena, statistical physics, scattering, perturbative techniques, treatment of systems of identical particles, and nuclear and particle physics phenomenology. Prerequisite: Physics 211. One course. *Staff*

213. Nonlinear Dynamics. (QR) Prerequisites: Computer Science 8 or 53, Mathematics 111, and Physics 51L, 52L. See C-L: Computer Science 264. One course. *Behringer or Greenside*

214. Introduction to Solid-State Physics. (NS) Discussion of solid-state phenomena including crystalline structures, X-ray and particle diffraction in crystals, lattice dynamics, free electron theory of metals, energy bands, and superconductivity, with emphasis on understanding electrical and optical properties of solids. Prerequisite: quantum physics at the level of Physics 143L or Electrical Engineering 211. C-L: Electrical Engineering 214. One course. *Teitsworth*

217S. Advanced Physics Laboratory and Seminar. (NS) Experiments involving the fields of electricity, magnetism, heat, optics, and modern physics. One course. *Meyer*

222S. General Relativity. (NS) Review of special relativity; ideas of general relativity; mathematics of curved space-time; formation of a geometric theory of gravity; Einstein field equation applied to problems such as the cosmological red-shift and blackholes. Prerequisites: Physics 181 and Mathematics 111 or equivalents. One course. *Lee*

225, 226. Elementary Investigations. (NS) Training in the laboratory and library methods of physical research. Qualified students may conduct elementary investigations under the supervision of a member of the staff. One course each. *Staff*

230. Mathematical Methods in Physics. (QR) Includes topics in complex analysis, residue calculus, infinite series, integration, special functions, Fourier series and transforms, delta functions, and ordinary differential equations; and use of MATHEMATICA for graphical, symbolic, and numerical computation. Prerequisite: Mathematics 111. One course. *Palmer*

231. Mathematical Methods in Electromagnetism. (NS) Mathematical topics include vector calculus, curvilinear coordinates, partial differential equations, orthogonal functions, Legendre polynomials, spherical harmonics, Bessel functions, and Green's functions. Topics from electromagnetism include Maxwell's equations, electrostatics, magnetostatics, potential theory, boundary-value problems, macroscopic media, and electromagnetic waves. Uses MATHEMATICA. Prerequisite: Physics 230. One course. *Palmer*

244. Nuclear and Particle Physics. (NS) Current ideas and models in nuclear and particle physics. Experimental methods; nuclear structure; nuclear reactions; families of elementary particles; quarks and gluons; weak interactions. Prerequisite: Physics 211. One course. *Staff*

261. Laser Physics. (NS) Laser physics and laser theory. Electromagnetic radiation and its interaction with matter. Laser excitation, oscillation, modulation, and detection theory. Prerequisites: Electrical Engineering 170L or Physics 182 and Electrical Engineering 211 or Physics 211. C-L: Electrical Engineering 276. One course. *Skatrud*

271. Quantum Optics. (NS) The linear and nonlinear interaction of electromagnetic radiation and matter. Topics include simple theory of lasers, second-harmonic generation, photon echos, bistability, Raman scattering, Brillouin scattering, phase conjugation, two photon lasers, and cooling and trapping of atoms. Prerequisites: Physics 212 and 231. One course. *Gauthier*

281. Classical Mechanics. (NS) Newtonian, Lagrangian, and Hamiltonian methods for classical systems; symmetry and conservation laws; rigid body motion; normal modes and forced oscillations; small nonlinear oscillations; canonical transformations; Hamiltonian chaos. One course. *Socular*

COURSES CURRENTLY UNSCHEDULED

102. Applications of Modern Physics in Medicine. (NS)

106. Topics in Astrophysics. (NS)

215. Principles of Quantum Theory. (NS)

240. Computer Applications to Physical Measurement. (NS)

THE MAJOR

Students majoring in physics are prepared for work in industrial and governmental laboratories. They are also prepared for graduate work in physics or for the study of medicine. Students planning to major in physics should enroll in Physics 41L, 42L in their freshman year. They should also arrange to complete the necessary mathematics as soon as possible.

For the A.B. Degree

Prerequisites. Physics 41L, 42L or 51L, 52L or 53L, 54L, or equivalents; Mathematics 31, 32, 103, 111, or equivalents, and one additional course at the 100 or 200 level.

Major Requirements. Physics 143L, 176, 181, 211, either 171L or 217S, and one other course in physics above 100 except for Physics 230. (For the major, Physics 230 is considered to be a mathematics course.)

For the B.S. Degree

Prerequisites. Physics 41L, 42L or 51L, 52L or 53L, 54L, or equivalents; Mathematics 31, 32, 103, 111, or equivalents, and one additional course at the 100 or 200 level.

Major Requirements. Physics 143L, 176, 181, 182, 211, 212, two among the laboratory courses 171L, 217S, and 225, plus one other course in physics above 100 except for Physics 230. (Students planning graduate study in physics are urged to take on additional elective in physics and one in mathematics. (For the major, Physics 230 is considered to be a mathematics courses).)

Honors/Distinction

The department offers upperclassmen the possibility of being associated with research conducted in the department. This work may lead to graduation with distinction. The department also offers Latin honors by honors project. See the section on honors in this bulletin.

Polish

For courses in Polish, see Slavic Languages and Literatures.

Political Science (PS)

Professor Aldrich, *Chair*; Professor Holsti, *Director of Undergraduate Studies*; Professors Ascher, Barber, Fish, Grieco, Horowitz, Hough, Keohane, Kitschelt, Kornberg, Lange, Mieckiewicz, Paletz, Price, and Spragens; Associate Professors Eldridge, Gillespie, Johns, and McKean; Assistant Professors Archer, Bianco, Brehm, Coles, Feaver, Grant, Gronke, Hamilton, Niou, Orr, Shi, Simmons, and Smith; Professors Emeriti Ball, Braibanti, Cleaveland, Hall, and Leach; Adjunct Professors Kessler and O'Barr

A major or a minor is available in this department.

Courses in political science for undergraduates are offered in four fields: (A) American government, politics, and public administration; (B) comparative government and politics; (C-N) normative political theory / (C-E) empirical political theory and

methodology; and (D) international law, relations, and politics. In the course descriptions below the field within which the course falls is indicated by the appropriate letter symbol (A, B, C-N/C-E, or D) after the course title. (The area of knowledge designation follows.) Courses numbered from 91 through 94 serve as an introduction both to the study of political science and to the subject matter and approaches of the relevant field. Middle and upper-level courses and seminars (numbered at the 100 and 200 levels respectively) consider particular aspects and topics within the field. In addition, independent study under faculty supervision enables students to explore topics of special interest. See below, following the course descriptions, for the listing of courses by fields, information on internships, and requirements for the major and honors.

INTRODUCTORY COURSES

The following courses introduce the study of political science. Courses numbered 91 through 94 each serve as the basic course in one of the four fields of the discipline. Students ordinarily will take at least one of these courses before proceeding to more advanced courses. Some advanced courses may require a particular introductory course as a prerequisite.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

90A. American Government and Politics (A). Credit for advanced placement on the basis of the College Board examination in American government and politics. Does not satisfy course requirements of the political science major. One course.

90B. Comparative Government and Politics (B). Credit for advanced placement on the basis of the College Board examination in comparative government and politics. Does not satisfy course requirements of the political science major. One course.

91. The American Political System (A). (SS) Theory and practice of American government and politics; federal-state relations; the separation and interrelationships of the executive, legislative, and judicial branches of government; judicial review; the role of political parties and public opinion; the formulation and execution of domestic and foreign policy; civil liberties. One course. *Staff*

91D. The American Political System (A). (SS) Same as Political Science 91 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Bianco*

92. Comparative Politics (B). (SS) Topics include problems of conceptualization and analysis; foundations of politics under democratic, authoritarian, and totalitarian regimes; theories of development and underdevelopment; revolution and collective violence; the role of elites, such as the military. C-L: Comparative Area Studies. One course. *Staff*

92D. Comparative Politics (B). (SS) Same as Political Science 92 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Archer*

93. Elements of International Relations (D). (SS) The nature of international politics, the analysis of national power, the instruments of foreign policy, and the controls of state behavior. One course. *Staff*

93D. Elements of International Relations (D). (SS) Same as Political Science 93 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Eldridge or Fawcett*

94. Contemporary Political Ideologies (C-N). (SS) Liberalism, conservatism, socialism, fascism, and feminism. One course. *Staff*

94D. Contemporary Political Ideologies (C-N). (SS) Same as Political Science 94 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

98. Introduction to Canada. (SS) See C-L: Interdisciplinary Course 98; also C-L: Canadian Studies, Comparative Area Studies, Economics 98, History 98, and Sociology 98. One course. *LeClerc or Thompson*

COURSES TAUGHT IN DUKE STUDY ABROAD PROGRAMS

100, A-N. Duke University Overseas Program. (SS) This number represents course credit for political science courses taken in Duke University Summer Session Study Abroad Programs or in Duke University semester or academic year programs with overseas universities. Register for program by designated suffix A through N. C-L: Comparative Area Studies. Variable credit.

100A. Duke Semester/Academic Year Program: Berlin. (FL, SS)

.01 Environmental Policy in Europe (B) (SS). Not open to students who have taken Political Science 162. One course.

.02 Germany: From Division to Unification (D) (FL,SS).

Taught in German. Not open to students who have taken Political Science 134. One course. C-L: Comparative Area Studies. Variable credit.

100C. Duke Summer Program: Zimbabwe/Botswana. (SS)

.01 Politics and Literature in Southern Africa (B). One course.

.02 Issues of Development and Dependence in Botswana and Zimbabwe (D).

One course. C-L: African and Afro-American Studies 100 and Comparative Area Studies. Variable credit.

100E. Duke Summer Program: London. (SS) .01 Media and Politics in Britain (B).

C-L: Comparative Area Studies. Two courses.

100J. Duke Wind Symphony Semester Program: Vienna. (SS) .01 Government and Politics of Austria in Europe (B). C-L: Comparative Area Studies. One course.

100K. Duke Summer Program: Cambridge (England). (SS)

.01 Anglo-American Constitutionalism, Law, and Legal Institutions (A). Not open to students who have taken Political Science 100D.01. One course.

.02 British Government and Constitutional Law (B). Not open to students who have taken Political Science 100D.02. One course.

C-L: Comparative Area Studies. Variable credit.

100L, S. Duke Summer Program: Oxford. (SS)

.01 Political System of Modern Britain (B). Not open to students who have taken Political Science 199B: Oxford. Two courses.

.02 Law and Liability: Personal Injury in Britain and the United States (B). Not open to students who have taken Political Science 199B: Oxford. Two courses.

C-L: Comparative Area Studies. Variable credit.

100M. Duke Summer Program: Spain. (SS) .01 Government and Politics of Spain (B). Not open to students who have taken Political Science 117: Comparative Government and Politics: Spain. C-L: Comparative Area Studies. One course.

100N. Duke in Brussels. (SS)

.01 The European Community: Progress, Problems, and Prospects. One course.

.02 The United States and Western Europe.

One course. C-L: Comparative Area Studies and Public Policy Studies 100A. Variable credit. *Grieco*

OTHER UNDERGRADUATE COURSES

101A, S. Issues in Twentieth-Century American Political Practice (A). (SS) Seminar on the nature of American government. Selected contemporary problems and institutions. Open only to students in the Twentieth-Century America (FOCUS) Program. One course. *Staff*

101B, S. Issues in Twentieth-Century Political Development (B). (SS) Seminar on agrarian origins of human societies and transitions to industrial societies with attendant economic growth, political conflict, and revolution. Politics of development examined; experiences of modern Africa, Soviet Union, and Viet Nam considered and compared to lessons supplied by Medieval Europe. Open only to students in the FOCUS Program, Contemporary Global Culture. One course. *Staff*

101C, S. Issues in Twentieth-Century American Political Theory (C-N). (SS) Seminar on contemporary issues of American political thought. Attempts to refurbish or develop alternatives to the dominant liberal tradition. Open only to students in the Twentieth-Century America (FOCUS) Program. One course. *Staff*

102. Comparative Analysis of Democratic Institutions (B). (SS) The selection and consequences of democratic political institutions with special emphasis on electoral systems and constitutions. One course. *Niou*

103. Introduction to Urban Politics (A). (SS) Theory and practice of American city politics: relationships between governmental structures and historical development; distribution of power; constituency demands. One course. *Orr*

104. Politics and Literature (C-N). (SS) The enduring questions of politics and political philosophy illustrated in Western literature: historical, literary, and philosophical analysis. One course. *Gillespie or Grant*

105. The Politics of Democratization in Eastern Europe (B). (SS) Overview of political regimes in selected East European countries, comparative analysis of modes of transition to democracy: constitutionalism, party systems and voting, private property rights and economic regulation under socialism and capitalism. One course. *Kitschelt*

106. International Security (D). (SS) International conflict in modern times. Causes and effects of war. Contemporary and future threats. One course. *Feaver*

106D. International Security (D). (SS) Same as Political Science 106 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Feaver*

107. Environmental Politics and Policies in the Industrial World (B). (SS) Comparative analysis of environmental problems, protest, preferred approaches, and policy mix chosen in politically diverse industrialized nations including the United States, Russia, Japan, and those in Europe. C-L: Comparative Area Studies and Public Policy Studies 107. One course. *McKean*

108. The American Presidency (A). (SS) The presidency and its impact on the American political system. One course. *Paletz*

109. State and Local Government Today (A). (SS) Problems in state, county, and city government. One course. *Orr*

110. American Political Parties (A). (SS) Introduction to party systems with application to the United States, including parties in the electorate, parties as organizations, and parties in government. One course. *Gronke*

111. Contemporary Japanese Politics (B). (SS) Introduction to political change in postwar Japan. Foundations of the modern industrial state, electoral politics, policy-making and bureaucracy, defense, foreign policy, and foreign trade. C-L: Comparative Area Studies. One course. *McKean*

115. Politics and Society in Germany (B). (SS) Industrialization, democratization, and fascism in Germany; social structure, political institutions, and political culture; selected public policies; Germany in the world economy and in world politics. C-L: Comparative Area Studies. One course. *Kitschelt*

117. Comparative Government and Politics: Selected Countries (B). (SS) Special topics course treating the political system of one or more countries from a comparative perspective. One course. *Staff*

120. International Conflict and Violence (D). (SS) Nature and processes of international conflict and violence with emphasis on contemporary instances of violence in international affairs. Consideration of restraints on violence. One course. *Eldridge*

121. International Organization (D). (SS) Political aspects of military and economic organizations at the global and regional levels of the international system. One course. *Grieco*

122. Modern International Politics (D). (SS) The major problems in contemporary international affairs with attention to superpower politics, specific regional concerns, and the problems associated with the emergence of a new international economic order. One course. *Eldridge*

123. Introduction to Political Philosophy (C-N). (SS) The nature and enduring problems of political philosophy, illustrated by selected theorists in the Western political tradition. One course. *Staff*

124. National Economic Statecraft (D). (SS) Identification and analysis of major sources of foreign policy, range of state political-economic goals in the international system, and policy instruments available to state pursuit of such goals. One course. *Grieco*

125. Comparative Approaches to Global Issues (B). (SS) See C-L: Comparative Area Studies 125; also C-L: Cultural Anthropology 125, History 137, Religion 121, and Sociology 125. One course. *Staff*

126. Theories of Liberal Democracy (C-N). (SS) Critical discussion of classic theorists, such as Locke, Rousseau, Mill, and Madison, and contemporary theories of liberal democracy. One course. *Grant or Spragens*

127. Law and Politics (A). (SS) Nature and functions of law; Anglo-American legal institutions; the process of judicial decision making; and the relationships among judges, lawyers, legislators, and administrators in the development of public as well as private law. One course. *Fish*

128. Politics of the Executive Branch (A). (SS) Policy-making in the executive branch of government: office of the president, cabinet, and independent agencies. Emphasis on relations with Congress and the courts. One course. *Staff*

130S. Voluntary Organizations and Social Policy (A). (SS) See C-L: Public Policy Studies 130S. One course. *Smith*

131. Introduction to American Political Thought (C-N). (SS) Basic elements in the American political tradition as developed from its English roots to the present. One course. *Grant or Spragens*

132. Politics of Asia (B). (SS) The impact of nationalism, development, and revolution on traditional Asian society and its emerging states. C-L: Comparative Area Studies. One course. *Staff*

133. Japanese Foreign Relations (D). (SS) Japan's increasing world role; emphasis on economic foreign policy and United States-Japanese relations. C-L: Comparative Area Studies. One course. *McKam*

135. Political Development of Western Europe (B). (SS) The development of the modern political systems of Britain, France, Germany, and other European countries; the spread of capitalism, the emergence of mass democracy and the rise of the welfare state. Contemporary developments examined in historical and theoretical perspective. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

136. Comparative Government and Politics: Western Europe (B). (SS) Modern political institutions and processes of European democracies: political parties, interest groups and parliaments; regional, religious, and class divisions; political participation and mobilization; relationships of state, society and economy; political, social and economic change in postwar Europe. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

137. Campaigns and Elections (A). (SS) An introduction to voting and elections in the United States, with emphasis on presidential nomination and election procedures, characteristics of the American electorate, and theories of voting behavior in presidential and congressional elections. One course. *Aldrich, Brehm, or Gronke*

138. Quantitative Political Analysis I (C-E). (QR) Basic applications of statistical methods to the analysis of political phenomena. Emphasis on research design, graphical display, probability, testing of hypotheses, statistical inference, and the use of computers. One course. *Brehm*

139. Conflict, Collusion, and Cooperation (C-E). (SS) How actors in the political process manipulate information, institutions, and strategies to produce preferred outcomes. Applications to elections, legislative behavior, international conflict, and other areas. One course. *Bianco or Niou*

140. Feminist Theory (C-N). (SS) Exploration of contemporary American feminist thought challenging traditional forms of power and the relationship between public and private reason and unreason. Included are works by liberal, radical, lesbian, and socialist feminists as well as works which address issues of concern specific to women of color. One course. *Staff*

141. Introduction to African-American Politics (A). (SS) Traces the history, evolution, and maturation of the African-American political experience in America from the colonial period through contemporary times. Impact of Afro-American political participation on the American political process and American public policy. C-L: African and Afro-American Studies 149. One course. *Orr*

142. War and Peace (D). (SS) The use of systems theory in comparative political history to explain why some international systems during particular periods have been plagued by war while others have been relatively peaceful. Special attention given to the Bismarckian system. One course. *Staff*

144. Force and Statecraft (D). (SS) Theory and practice of the use of force as an instrument of state policy in international relations. Prerequisite: Political Science 93 or equivalent. One course. *Fewer*

145. Political Analysis for Public Policy-Making (A). (SS) Prerequisite: Political Science 90A, 91, 101, or equivalent. See C-L: Public Policy Studies 114. One course. *Ascher, Hamilton, Mayer, Mickiewicz, Miller, or Smith*

146D. American Legislative Behavior (A). (SS) An introduction to the American legislative process, with specific focus on the U.S. Congress. Emphasis on legislative rules and procedures, congressional elections, and the behavior of legislators in their representative and policy-making roles. One course. *Bianco or Gronke*

147. Environmental Politics and Policies in the Developing World (B). (SS) Problems of sustainable development and early industrialization in the Third World; special focus on land use, agriculture, deforestation, desertification, wildlife, water, and population growth, Third World cities, early industrialization, and aid for development projects. C-L: Comparative Area Studies and Public Policy Studies 147. One course. *McKean or Miranda*

148D. Environmental Politics Beyond Borders (B). (SS) International environmental problems and politics, from transboundary pollution (for example, acid rain, international rivers) to degradation of global commons (global warming, biodiversity, ozone, overfishing, and pollution of the high seas). Includes issues of trade, investment, debt, and transnational corporations. C-L: Comparative Area Studies and Public Policy Studies 143D. One course. *McKean*

151. Introduction to Latin American Politics (B). (SS) Historical and cultural context of political institutions and behavior, the role of traditional and emerging groups and forces, political instability and the decision-making process. C-L: Comparative Area Studies. One course. *Archer*

153, 154. Politics and the Media of Mass Communication 153 (B), 154 (A). (SS) Analysis of the nature, organization, and products of the mass media (especially the movie, television, and newspaper industries) as they affect the political systems, political processes, institutions, and people of the United States and other nations. Open to juniors and seniors. It is desirable but not required that students taking 153 continue with 154. With consent of the instructor, students who have not taken 153 may enroll in 154. C-L: Comparative Area Studies; Film and Video; and Women's Studies. One course each. *Paletz*

155. The Politics and Economics of Developing Areas (B). (SS) Process and politics of transition of rural and agrarian societies to urban and industrial societies: Soviet Union, United States, India, Africa, and Asia. C-L: Comparative Area Studies. One course. *Staff*

157D. Foreign Policy of the United States (D). (SS) Sources of American foreign policy, containment, international economic policy, deterrence, arms control, and disarmament. Prospects for the future. Emphasis on the period since World War II. One course. *Holsti*

159. Ambition and Politics (C-N). (SS) A theoretical examination of the role of ambition in politics, including works by or on Homer, Plato, Plutarch, Machiavelli, Shakespeare, Tocqueville, Nietzsche, and Hitler. One course. *Gillespie*

160. Contemporary Global Issues (D). (SS) See C-L: Comparative Area Studies 109; also C-L: Cultural Anthropology 109, History 109, and Sociology 175. One course. *Staff*

164. Political Organizations (A). (SS) Using classical organization theory and research on decision-making behavior of the members of political organizations to study those organizations (such as political parties, labor unions, businesses, and public bureaucracies). One course. *Brehm*

165. Government and Politics of the Soviet Union (B). (SS) Analysis of the Soviet political system, emphasizing the sources of stability and instability and the responsiveness of its policies. Literature on the non-Soviet world (notably the United States) will be included. C-L: Comparative Area Studies. One course. *Hough*

166. Soviet Foreign Relations (D). (SS) Nature of the Soviet Union's relations with other states. Determinants and formulation of foreign policy. C-L: Comparative Area Studies. One course. *Hough*

167D. International Law (D). (SS) Introduction to the main concepts and themes in public international law. The role of states and international organizations in international law, treaties, the law of the sea, human rights, self-determination, and European integration. The sources of international law and its impact on state action. One course. *Simmons*

168. Analysis of Political Decision Making (C-E). (SS) Surveys of some of the most prominent problems, methods, ideas, and findings that have emerged in recent theoretical studies of politics. Intellectual puzzles, speculative models and normative and explanatory applications, individual decision theory, game theory, and social choice theory. Not open to students who have taken Political Science 139. One course. *Niou*

170. Europe Transformed (D). (SS) Transformation in intra-European relations since 1980. Topics covered: the Cold War and its termination in Europe, Warsaw Pact dissolution, new roles for NATO, European Community, and United States in Europe. C-L: Comparative Area Studies. One course. *Grieco*

171. Politics of South African Apartheid (B). (SS) The South African political system in the twentieth century, with particular attention to the economic and ethnic roots of racial conflict. United States-South African relations. C-L: African and Afro-American Studies 171 and Comparative Area Studies. One course. *Johns*

172. Introduction to the Politics of the Communist System (B). (SS) The development of the Communist Movement as a consequence of the Industrial Revolution. Marxist theories and some of the underlying structural and dynamic principles of Marxism-Leninist systems. Social, economic, and political transformations undertaken under the auspices of Stalin and Mao. Issues related to the reform of Marxist-Leninist systems. One course. *Shi*

173S. Political Economy of World Food Problems (B). (SS) Changing policies toward food production and distribution. Topics include American agricultural policy, international food and famine aid, and Third World agricultural development strategies. C-L: Comparative Area Studies. One course. *Johns*

174S. Political Biography (A). (SS) Nature of politics as revealed in the life histories of individuals. Readings in single biographies and autobiographies, but with some comparative work. Students project their autobiographies toward possible political futures. One course. *Barber*

175A. Political Philosophy and Distributive Justice. (SS) Prerequisites: Economics 1D or 51D and Economics 2D or 52D. See C-L: Economics 199. One course. *Moulin*

176A. Perspectives on Food and Hunger (B). (SS) See C-L: Interdisciplinary Course 120A; also C-L: Comparative Area Studies. One course. *Johns*

176B. Perspectives on Food and Hunger (B). (SS) See C-L: Interdisciplinary Course 120B; also C-L: Comparative Area Studies. One course. *Johns*

177, 178. American Constitutional Development (A). (SS) Development of the United States Constitution through Supreme Court decisions. 177: The foundations of national power, including judicial power, the nature of the federal Union, and economic

development since 1790. 178: The scope of authority, liberty, and equality through interpretations of the Bill of Rights and the Fourteenth Amendment. May not be taken by students who have taken Political Science 118 and/or Political Science 143. C-L: History 177A, 177B. One course each. *Fish*

179. Ecological Crisis and Political Theory (C-N). (SS) Interconnections between various dimensions of the ecological crisis including: conceptions of self, nature, ecological ethics, and environmental justice as related to politics, economics, and new social movements. One course. *Coles*

180. Media in Comparative Perspective (B). (SS) See C-L: Interdisciplinary Course 182; also C-L: Canadian Studies, Comparative Area Studies, Film and Video, and Sociology 182. One course. *Smith*

181. Marxism and Neo-Marxism (C-N). (SS) Development of Marxism from Marx to the present. Critiques of capitalist political culture; the methodological underpinnings of various theorists, the conceptions of self and society which have animated these critiques. Works by Marx, Engels, Luxemburg, Lenin, Adorno, Horkheimer, Marcuse, Gramsci, Lukacs, Merleau-Ponty, Sartre, Habermas. One course. *Coles*

182. Classical Political Philosophy (C-N). (CZ) Ancient theories of the way of life and the political regime best suited to promote happiness in human communities. Readings from the Greek sophists, Aristophanes, Plato, Aristotle, the academic skeptics, Stoics, and Cicero. Prerequisite: junior standing; open to sophomores by consent of instructor. One course. *Staff*

184S. Canadian Issues (B). (SS) Prerequisite: Interdisciplinary Course 98 or consent of instructor. See C-L: Interdisciplinary Course 184S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 184S, Economics 184S, History 184S, and Sociology 184S. One course. *Staff*

185S. The Canadian Health Care System (B). (SS) See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 185S, Economics 185S, History 108E, Public Policy Studies 187S, and Sociology 185S. One course. *Boychuck or LeClerc*

187S. Politics and the Libido (A). (SS) Effects of the libido on elite and mass political activities. Government regulation of sex-inspired behavior. C-L: Women's Studies. One course. *Paletz*

188. The Psychology of Political Symbols (A). (SS) The role of symbolic political issues in determining public attitudes and voting behavior. Symbolic political issues such as "law and order," pornography, and prohibition; distinguished from public welfare issues such as employment policies. C-L: Public Policy Studies 188. One course. *McConahay*

189, 190. Internship (A). Open to students engaging in practical or governmental work experience during the summer or a regular semester. To enroll, a student must obtain the approval of the director of undergraduate studies. A faculty member in the department will supervise a program of study related to the work experience, including an analytical paper on a politics-related topic. One course each. *Staff*

191, 192. Independent Study (A, B, C, or D). Directed reading and research. Open only to qualified juniors by consent of the director of undergraduate studies and of the supervising instructor. One course each. *Staff*

193, 194. Independent Study (A, B, C, or D). Directed reading and research. Open only to seniors by consent of the director of undergraduate studies and of the supervising instructor. One course each. *Staff*

196. American University Washington Semester. This number represents transfer credit for American Government and Politics or International Relations topics courses taken at American University in the fall or spring Washington Semester Program: Seminar I (one course), Seminar II (one course), Research Project (one course), Internship (one course). Prior approval for admission into this program must be obtained from the director of undergraduate studies in political science. Four transfer credits.

A. Programs in American Government and Politics

D. Programs in International Relations

Four courses.

199. Special Topics in Government and Politics. (SS) Topics vary from semester to semester.

A. American Government and Politics

B. Comparative Government and Politics

C. Political Theory

D. International Relations

One course. *Staff*

For Seniors Only

200H. Senior Honors Program (A, B, C, or D). (SS) Consent of instructor required.

.01 Great Books in Political Science. One course.

.02 Senior Thesis Design, Research, Writing. One course.

.03 Senior Thesis Writing and Defense. One course.

Variable credit. *Staff*

200S. Senior Seminars. (SS) Open also, if places are available, to qualified juniors who have earned a 3.0 average and obtain the consent of the instructor.

A. American Government and Politics

B. Comparative Government and Politics

C. Political Theory

D. International Relations

One course. *Staff*

For Seniors and Graduates*

201S. Problems in International Security (D). (SS) Major security issues. Prerequisite: a course in international relations or American foreign policy. One course. *Staff*

202. American Foreign Economic Policy (D). (SS) Formulation and implementation of American foreign economic policy in the twentieth century. Topics include theories of foreign economic policy-making, commercial and monetary policy, energy and agricultural policies, trade and security, aid to developing countries, management of the debt crisis, foreign investment, the industrial policy debate, and multinational corporations and banks. One course. *Simmons*

203S. Issues in Politics and the Media in the United States (A). (SS) Research seminar analyzing significant questions in the relationship between politics and the media of communication. Consent of instructor required. C-L: Film and Video. One course. *Paletz*

*The following courses may be taken by juniors who have earned a 3.0 average and obtained the consent of the instructor.

205S. The Political Economy of Environmental Resources (B). (SS) The rational choice tradition (public goods, collective action, game theory, property rights, new institutionalism) as applied to environmental problems, resource exploitation, environmental justice, and the design of an environmentally sound society. One course. *McKean*

207S. American Constitutional Interpretation (A). (SS) U.S. Supreme Court interpretation of selected provisions of the Constitution. Prerequisites: Political Science 118 or 127 or 143 and consent of instructor. One course. *Fish*

209. Problems in State Government and Politics (A). (SS) One course. *Staff*

213S. Theories of International Political Economy (D). (SS) Comparison and assessment of traditional and modern theories in terms of their logical and empirical validity. One course. *Grieco*

216S. Evolution of European Marxism (C-N). (SS) The central themes in the evolution of European Marxism: socialist thought prior to Marx; the writings of Marx and Engels. The themes are articulated in: Russian Marxism; Soviet Communism and its Marxist critics; the rethinking of Marx's political economy, the theory of the state, and concepts of class consciousness in the works of twentieth-century European Marxists. C-L: Comparative Area Studies. One course. *Coles*

217. Comparative and Historical Methods (B). (SS) See C-L: Sociology 214; also C-L: Comparative Area Studies. One course. *Gereffi, Janoski, Lin, Smith, or Tyrakian*

218. Political Thought in the United States (C-N). (SS) American political thought through the Civil War period. The Founders and their European antecedents. Debates over the Constitution, slavery, and the Union. One course. *Gillespie or Grant*

220S. Problems in International Politics (D). (SS) Prerequisite: one course in international relations, foreign policy, or diplomatic history. One course. *Holsti*

222. Introduction to Statistical Analysis (C-E). (QR) Basic applications of statistical theory to political questions: research design, hypothesis tests, computer data analysis. Consent of instructor required for undergraduates. One course. *Bianco, Brehm, or Gronke*

223. Ancient Political Philosophy (C-N). (SS) Intensive analysis of the political philosophy of Plato, Aristotle, and other ancient theorists. C-L: Classical Studies 203. One course. *Gillespie or Grant*

224S. Modern Political Theory (C-N). (SS) A historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. The rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. One course. *Grant or Spragens*

225. Topics in Comparative Government and Politics: Western Europe (B). (SS) Topics vary: the development of mass democracy and the welfare state; political and electoral participation and mobilization; social movements and political change; center-periphery conflicts; government and bureaucratic institutions and their relationships to society; the modern welfare state and political economy. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

227S. Issues in International Communications (B). (SS) Research seminar analyzing selected political issues in international communications. C-L: Film and Video. One course. *Paletz*

228S. Nineteenth- and Twentieth-Century Political Philosophy (C-N). (SS) Topics in nineteenth- and twentieth-century political philosophy, considering such authors as Hegel, Marx, Nietzsche, Kant, Fichte, Dostoevsky, and Heidegger. One course. *Coles or Gillespie*

229S. Contemporary Theory of Liberal Democracy (C-N). (SS) One course. *Spragens*

230S. Introduction to Positive Political Theory (C-E). (SS) Basic concepts of political economy, theory of preference and choice, social choice theory, and decision and game theory. One course. *Aldrich, Bianco, or Niou*

231S. Crisis, Choice, and Change in Advanced Democratic States (B). (SS) Contributions of Marx, Weber, and Durkheim toward analysis of modern democracies. Examination of selected contemporary studies using these three perspectives to highlight processes of change and crisis. Unsettling effects of markets upon political systems, consequences of bureaucratic regulation, and transformation of sources of solidarity and integration in modern politics. C-L: Comparative Area Studies. One course. *Kitschelt*

232. Political Economy: Theory and Applications (C-E). (SS) Selected topics. C-L: Comparative Area Studies. One course. *Lange*

233. Intermediate Statistical Methods (C-E). (QR) Applications of regression models of politics emphasizing the effect of assumptions behind Generalized Least Squares regression. Prerequisite: Political Science 222; consent of instructor required for undergraduates. One course. *Bianco, Brehm, or Gronke*

234S. Political Economy of Development: Theories of Change in the Third World (B). (SS) Alternative approaches to political economy and social change in the Third World. C-L: Comparative Area Studies, Cultural Anthropology 234S, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Staff*

236S. Hegel's Political Philosophy (C-N). (SS) Within context of Hegel's total philosophy, an examination of his understanding of phenomenology and the phenomenological basis of political institutions and his understanding of Greek and Christian political life. Selections from *Phenomenology*, *Philosophy of History*, and *Philosophy of Right*. One course. *Gillespie*

238S. Development of United States Courts of the Fourth Circuit (A). (SS) Examines judges, courts, and law of United States district and old circuit courts and Court of Appeals: Maryland, Virginia, West Virginia, North Carolina, South Carolina, 1789-1958. Consent of instructor required. C-L: History 255A and Law 486S. One course. *Fish*

239. Comparative History and International Relations (D). (SS) Forces central to the practice of politics and international relations. Theoretical perspectives include those of Oswald Spengler, Schumpeter, Marx, Weber, and Aron as well as historical cases such as the Russian Revolution, the world wars, the Depression, and the nuclear era. One course. *Staff*

240. American Political Behavior (A). (SS) One course. *Staff*

244S. The Politics of the European Community (D). (SS) Historical, theoretical, and analytical treatment of reform and renewal of the European Community: trade, finance, economic and technological relationships. Impact of European Community development on international relations and American foreign policy. One course. *Grieco*

247. Politics and Philosophy of Self and Other (C-N). (SS) Epistemological, ontological, ethical, and political dimensions of relations between self and other. Theorists may include Husserl, Merleau-Ponty, Levinas, Derrida, Adorno, Gadamer, Sartre, Foucault, and Bakhtin. One course. *Coles*

249. The Politics of Health Care (A). (SS) See C-L: Public Policy Studies 253. One course. *Sprinkle*

250S. International Security after the Cold War (D). (SS) Contemporary issues in international security: nuclear proliferation, balance of power, the role of force, alternative viewpoints. Consent of instructor required. One course. *Fever*

253S. Comparative Government and the Study of Latin America (B). (SS) Current literature on major themes of Latin American politics. C-L: Comparative Area Studies. One course. *Archer*

254S. Essential Global Democracy (A). (SS) The failure and success in establishing real democracy, including focus on the main leaders. Issues of law, rights, equality, representation, reasoning, and other principles addressed in the context of practical politics. One course. *Barber*

255. Political Sociology (B). (SS) See C-L: Sociology 255; also C-L: Canadian Studies. One course. *Smith or Tiryakian*

256S. Arms Control and National Security Policy (D). (SS) The evolution of nuclear weapons and strategy and of global defense policy toward the Soviet Union and other adversaries; the arms control process and nonproliferation. Consent of instructor required. One course. *Staff*

257S. Making American Defense Policy (D). (SS) Theory and practice of politics of national security in the United States. One course. *Fever*

258. Global Interdependence. (SS) Historical, cultural, political, economic, and technological factors underlying increasing global interdependence. Different forms interdependence can and has taken. Earlier forms of interdependence and the events that shaped their development and destruction. Topics covered include the transmission of technological innovation and of new diseases as well as the rise of economic regionalism and how modern states have organized their responses. Open to seniors and graduate students including those in the professional schools. One course. *Aharoni and staff*

260S. The Tradition of Political Inquiry (C-N). (SS) Past and present problems, goals, presuppositions, and methods. One course. *Spragens*

262S. International Communism (B). (SS) C-L: Comparative Area Studies. One course. *Hough*

265S. The Process of International Negotiation (D). (SS) See C-L: Public Policy Studies 265S; also C-L: Canadian Studies. One course. *Mayer*

266S. Comparative Social Policy (B). (SS) See C-L: Public Policy Studies 266S; also C-L: Comparative Area Studies. One course. *Smith*

267S. Policy-Making in International Organizations (D). (SS) See C-L: Public Policy Studies 267S. One course. *Ascher*

269S. War and Wealth in the International System (D). (SS) The interaction between international economics and international security. Focus on the security implications for states that result from their participation in the international economy and the impact that these security concerns have on national strategies in the world economy. One course. *Grieco*

270S. Fundamentals of Political Economy (C-E). (SS) Application of economic reasoning to the study of politics. Analysis of campaigns and elections; legislatures; and the regulation of industries. C-L: Economics 280S. One course. *Aldrich, Bianco, or Niou*

271. International Environmental Regimes (B). (SS) Law, politics, and institutional design of international regimes created among nations to cope with environmental

problems. Includes study of particular conventions and treaties (for example, acid rain, ozone, carbon reduction, biodiversity, Antarctica, regional seas, ocean dumping), and the environmental implications of international trade rules and regimes (for example, GATT). C-L: Comparative Area Studies and Public Policy Studies 258. One course. *McKern*

272. Chinese Foreign Policy (B). (SS) The formulation and development of Chinese foreign relations and foreign policy since 1949. One course. *Shi*

274S. Seminar in Urban Politics and Urban Public Policy (A). (SS) A probing of topical issues in both their theoretical antecedents and their contemporary manifestations. The intellectual debates and scholarly treatments surrounding issues of power in the city, urban redevelopment policy, urban poverty, and race in the city. C-L: Public Policy Studies 275S. One course. *Orr*

275. The American Party System (A). (SS) An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. One course. *Staff*

276. Soviet and Post-Soviet Political Communication. (SS) See C-L: Public Policy Studies 243. One course. *Mickiewicz*

277. Comparative Party Politics (B). (SS) The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. C-L: Canadian Studies and Comparative Area Studies. One course. *Lange*

279S. Political Protest and Collective Mobilization (B). (SS) Survey of theories, methods, and empirical studies of political mobilization outside institutional channels; protest behavior and strategies; responses of the state to these challenges; the success of collective mobilization. Emphasis on comparative analyses of protest in advanced industrial democracies. One course. *Kitschelt*

282S. Canada (B). (SS) See C-L: History 282S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 282S, Economics 282S, Interdisciplinary Course 282S, and Sociology 282S. One course. *Staff*

284S. Public Policy Process in Developing Countries (B). (SS) See C-L: Public Policy Studies 284S; also C-L: Comparative Area Studies. One course. *Ascher*

299. Advanced Topics in Government and Politics. (SS) Topics vary from semester to semester.

- A. American Government and Politics
 - B. Comparative Government and Politics
 - C. Political Theory
 - D. International Relations
- One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

100B. Duke Summer Program: Brazil. (SS)

100F. Duke Summer Program: Israel. (SS)

100G. Duke Summer Program: Mexico. (SS)

100H. Duke Semester Program: Bologna. (SS)

112S. Shaping the News (A). (SS)

- 113. International Political Economy (D). (SS)
- 114. Public Opinion (A). (SS)
- 116S. The Small Democracies in Europe (B). (SS)
- 129. Political Participation (A). (SS)
- 149. United States and East Asia (D). (SS)
- 150. The Individual and Society: The Classical View (C-N). (CZ)
- 152. Political Mobilization of the American Public (A). (SS)
- 161S. Comparative Government and Politics: Africa (B). (SS)
- 163. Gender, Politics, and Policy: The Third World Case (B). (SS)
- 169. Politics in Revolutionary China (B). (SS)
- 183D. Hellenistic Philosophy (C-N). (CZ)
- 186. Political Leadership (A). (SS)
- 195. Comparative Political Behavior in the United States and Canada (B). (SS)
- 204S. Ethics in Political Life (C-N). (SS)
- 208S. Analyzing the News (A). (SS)
- 211S. Current Problems and Issues in Japanese Politics (B). (SS)
- 212S. Domestic Structures and Foreign Policies of Advanced Democratic States (D). (SS)
- 214S. The Politics of Scarcity (B). (SS)
- 215S. Philosophical Bases of Political Economy and Society (C-E). (SS)
- 219S. Film and Politics (A). (SS)
- 221S. International Institutions and the World Political Economy (D). (SS)
- 226S. Theories of International Relations (D). (SS)
- 235S. Comparative Development of Islam (B). (SS)
- 237S. Comparative Public Policy (B). (SS)
- 241S. The Political Thought of Asia from Manu to Mao (C-N). (SS)
- 243S. Political Applications of Game Theory (C-E). (SS)
- 246S. Political Hypocrisy and Idealism (C-N). (SS)
- 251S. The American Presidency (A). (SS)
- 252S. The Nation-State and the International System (D). (SS)
- 259S. Low Intensity Conflict and the Lessons of Viet Nam (D). (SS)
- 261. Politics and the Future (D). (SS)
- 263S. Methods of Political Science (C-E). (SS)
- 268. The Regulatory Process (A). (SS)
- 280S. Comparative Government and Politics: Sub-Saharan Africa (B). (SS)

283S. Congressional Policy-Making (A). (SS)

293. Federalism (B). (SS)

POLITICAL INTERNSHIPS

The department administers an internship program, primarily in Washington, D.C., for political science majors and interested nonmajors. Students participate by qualifying for a position obtained by the department or by acquiring their own relevant employment, with or without compensation. Course credit can be obtained by enrolling in Political Science 189 or 190 and writing an analytical paper on a politics-related topic. Potential applicants should contact the internship director, Louise Walker (339 Perkins), at any time, but preferably in the fall semester.

POLITICAL SCIENCE COURSES BY FIELDS

Political science courses for undergraduates are offered in four fields. The courses in each of the four fields are listed below; in the course descriptions above, the field in which each course falls is indicated by the appropriate symbol (A, B, C-N/C-E, or D). Students majoring in the department must complete at least one course in each of three fields.

American Government, Politics, and Public Administration (A). Political Science 49S,* 91, 91D, 100D, 101A,S, 103, 108, 109, 110, 112S, 118, 127, 128, 129, 130S, 137, 141, 143, 145, 146, 152, 154, 164, 174S, 186, 187S, 188, 189, 190, 191,* 192,* 193,* 194,* 196, 197S-198S,* 199A, 200A,S, 203S, 207S, 208S, 209, 219S, 238S, 240, 248, 251S, 268, 274, 275, 283S, 299A.

Comparative Government and Politics (B). Political Science 49S,* 92, 92D, 98, 100B, 100C, 100D, 100E, 100F, 100H, 101B,S, 102, 105, 107, 111, 115, 116S, 117, 125, 132, 135, 136, 151, 153, 155, 161S, 162, 163, 165, 169, 171, 173S, 176A, 176B, 180, 184S, 191,* 192,* 193,* 194,* 195, 197S-198S,* 199B, 200B,S, 205S, 211S, 214S, 217, 225, 227S, 231S, 234S, 235S, 237S, 249, 253S, 255, 262S, 266S, 277, 279S, 280S, 282S, 284S, 293, 299B.

Political Theory: Normative (C-N). Political Science 49S,* 94, 94D, 101C,S, 104, 123, 126, 131, 140, 150, 159, 179, 181, 182, 183D, 191,* 192,* 193,* 194,* 197S-198S,* 199C-N, 204S, 215S, 216S, 218, 223, 224S, 228S, 229S, 241S, 245, 246S, 247, 260S, 264S, 299C-N. **Empirical and Methodology (C-E).** Political Science 138, 139, 168, 191*, 192*, 193*, 194*, 197S-198S*, 199C-E, 215S, 222, 230S, 232, 233S, 243S, 263S, 270S, 299C-E.

International Law, Relations, and Politics (D). Political Science 49S,* 93, 93D, 100C, 100G, 106, 113, 120, 121, 122, 124, 133, 134, 142, 144, 147, 149, 156, 157, 158, 160, 166, 167, 170, 191,* 192,* 193,* 194,* 197S-198S,* 199D, 200S,D, 201S, 202, 206, 210S, 212S, 213S, 220S, 221S, 226S, 239, 244S, 250, 252, 256S, 257S, 259S, 261, 265S, 267S, 299D.

THE MAJOR

The major requires ten courses in political science including (1) at least one course in each of three fields; (2) at least one course at Duke at the 200-299 level; and no more than three cross-listed courses originating outside the Department of Political Science. The department also requires that each major select one area of concentration.

An area of concentration is defined as five courses, at least one of which must be at the 200 level. The twelve areas of concentration and the courses that qualify for each area are listed below. It should be noted that many courses are listed under more than a single area of concentration. All majors are required to select a concentration in consultation with their advisor; majors are strongly encouraged to make their selection by the end of the first semester of their junior year.

*If subject matter is appropriate to the field.

All courses currently being offered by the department are listed under one or more areas of concentration, but this list does not include courses that may be offered by visiting faculty, courses taken abroad, courses transferred from other universities, or courses that may have content that varies from year to year. More specifically, the following types of courses are not included in these lists:

- PS 49S—First-year seminars
- PS 100—Duke study abroad programs
- PS 189, 190—Internship credit.
- PS 191-194—Independent Study
- PS 196—Washington Semester Program
- PS 200A-D—Senior Seminars

Students taking such a course should consult with their advisors to determine in which sequence it will be assigned. The same procedure will apply to courses taught on a one-time basis by visiting faculty.

Areas of Concentration

American Institutions and Public Policy

- Introductory—91, 101A
- 100-Level—103, 108, 109, 110, 127, 128, 130S, 131, 139, 141, 145, 146, 154, 157D, 164, 187S
- 200-Level—200A, 200H, 203S, 207S, 208S, 209, 218, 230, 251, 257, 268, 274S, 275, 283S, 293

Public Opinion, Campaigns, and Elections

- Introductory—91
- 100-Level—110, 114, 129, 131, 137, 152, 154, 188
- 200-Level—200A, 200H, 203S, 208S, 219S, 240, 275

Philosophical and Legal Foundations of American Politics

- Introductory—91
- 100-Level—126, 127, 131, 146D, 177-178
- 200-Level—200A, 200H, 207S, 218, 229S, 238S, 254

Comparative Democracies*

- Introductory—91, 92, 98
- 100-Level—102, 110, 111, 114, 115, 117, 126, 135, 136, 137, 139, 151, 153, 164, 174S, 180, 184S, 186, 195
- 200-Level—200A, 200B, 200H, 211S, 219S, 225, 231, 237S, 240, 253, 254, 275, 277, 279S, 282S, 293

Comparative and International Political Economy

- Introductory—92, 93
- 100-Level—107, 113, 122I, 125, 136, 139, 147, 155, 164, 170, 172, 173S, 176A, 176B
- 200-Level—200B, 200D, 200H, 205S, 213S, 218, 221S, 232, 243S, 244S, 270S

Politics of Socialist and Capitalist Development

- Introductory—92
- 100-Level—101B, 105, 117, 132, 149, 151, 155, 161S, 163, 165, 171, 173S, 176A, 176B
- 200-Level—200B, 200H, 234S, 253S, 262S, 267S, 284S

International Security

- Introductory—93
- 100-Level—106, 120, 122, 142, 144, 157D, 167D

*Students selecting this sequence must select at least two courses that deal with non-North American political systems.

200-Level—200D, 200H, 201S, 250S, 256S, 257S, 259S

Problems and Issues in Contemporary International Relations

Introductory—93

100-Level—113, 120, 121, 122, 147, 160, 167D

200-Level—200D, 200H, 201S, 205S, 220S, 226S, 227S, 252S

Comparative Foreign Policy Analysis

Introductory—93

100-Level—124, 133, 149, 157D, 166

200-Level—200D, 200H, 202, 212S, 272

International Political Economy

(see Comparative Politics)

Political Theory

Introductory—94, 123

100-Level—101C, 104, 123, 126, 131, 140, 150, 159, 179, 181, 182

200-Level—200C, 200H, 204S, 216S, 218, 223, 224S, 228S, 229S, 236S, 241S, 245, 246S, 247, 254, 260S

Research Methods

Introductory—139

100-Level—125, 145, 164, 168

200-Level—200H, 205S, 230S, 232, 243S, 270

Of the ten required political science courses, at least six must be taken at Duke to meet major requirements. However, only five Duke political science courses need be taken if the student: (1) is transferring courses from a year-long approved study abroad program; or (2) transferred to Duke after completing two undergraduate years at another institution; or (3) completed one semester at an approved study abroad program and one semester in the Washington Semester Program at American University. For the purpose of this requirement courses in the Washington Semester Program at American University (Political Science 196, I-IV) will be counted as transfer courses.

Advanced Placement Credit. Advanced placement credits in political science (score of 4 or 5). These course credits are designated as Political Science 90A (American Government and Politics) and Political Science 90B (Comparative Government and Politics). Such credits are applied toward the thirty-four credits needed for graduation and enable students to enroll in any 90-level introductory course(s) and permit them to enroll in advanced American and/or Comparative Government course(s). Advanced placement course credits (90A, 90B) do not satisfy course requirements for the political science major.

Suggested Work in Related Disciplines. Selected courses in such disciplines as anthropology, economics, history, philosophy, psychology, public policy, religion, and sociology are desirable.

THE MINOR

The department offers a minor in political science, for which the requirements are: a minimum of five (5) courses in political science, no more than two of which may be numbered less than 100.

HONORS/DISTINCTION

The department offers students majoring in political science a senior honors program, by successful completion of which a participant achieves graduation with distinction in political science. The central requirement of the program is an honors thesis which the student prepares under faculty supervision. The honors program consists of three courses. The prerequisite is Political Science 200H.01 (Great Books in Political Science), usually taken in the second semester of the junior year. This course is open to all juniors and seniors, but registration priority is accorded those juniors who are qualified candidates for admission into the Senior Honors Seminar

(Political Science 200H.02). Seniors entering their seventh semester who have attained at least a 3.3 grade point average overall and a 3.5 average in political science courses are eligible for admission to this seminar. Also eligible for admission are any other entering seventh-semester seniors who have performed in Political Science 200H.01 to the satisfaction of the instructor. Upon request, that instructor may recommend admission to the honors seminar of a student who lacks one or both requisite grade point averages. The program director must approve any recommended student's admission.

Qualified juniors will be invited during the fall semester of their junior year to enroll in Political Science 200H.01 to be offered during the ensuing spring semester. Interested students will review their academic plans with the program director for permission to enroll in a course examining leading political science literature. Political Science 200H.02, a seminar usually taken in the fall of the senior year, is devoted to development of the honors thesis and includes close supervision of the writing stage of the project by a faculty supervisor selected by the student. Continued close faculty supervision of the project occurs in Political Science 200H.03, which is an independent study course.

Completion of the thesis, its evaluation, and its defense before a three-member faculty committee warrants graduation with distinction in political science if a grade of A- or better is assigned to the student's thesis and performance in Political Science 200H.02 and 200H.03. The intradepartmental concentration option is partially satisfied by successful completion of the two-course senior honors thesis seminar. Further information may be obtained from the Honors Program director or from the director of undergraduate studies.

Latin Honors by Honors Project. A major in political science who wishes to be a candidate for Trinity College Latin honors by honors project must: (1) have an overall grade point average of 3.5 in political science at the commencement and termination of the project, (2) enroll in and successfully complete the Senior Honors Program (Political Science 200H.01, .02, .03), (3) provide written notice to the faculty director of that program and to the director of undergraduate studies of an intention to seek Latin honors. Following the candidate's oral defense of the honors thesis, the three-member examination committee, which has determined that the candidate merits graduation with distinction in political science, will evaluate the candidate's eligibility for any level of Latin honors. The director of the Senior Honors Program, who also serves as a member of the Undergraduate Affairs Committee of the Department of Political Science, will so advise the committee. If the candidate is deemed to be eligible for Latin honors by honors project, that committee will evaluate the candidate's performance in the honors program and his or her overall academic performance in the major and in the full course of study at Duke, and, if warranted, will certify such candidate for a specific level of Latin honors.

Psychology (PSY)

Faculty in Psychology—Experimental: Professor Lockhead, *Chair*; Professor R. Erickson, *Director of Undergraduate Studies*; Professors Brodie, Eckerman, C. Erickson, W. G. Hall, Holland, Palmer, Purves, Rubin, Staddon, and M. Wallach; Associate Professors Kuhn, Marsh, Meck, Nowicki, Schmajuk, and Williams; Assistant Professor Needham; Professors Emeriti Diamond, Kimble, Kremen, H. Schiffman, and Wing; Assistant Professor of the Practice Conley; Research Professors Crovitz, W. C. Hall, Marsh, S. Schiffman, and L. Wallach; Assistant Research Professors Higa, D. Smith, Swithers, and Welsh; Adjunct Associate Professor Swartzwelder; Adjunct Assistant Professor Izard

Faculty in Psychology—Social and Health Sciences: Professor Costanzo, *Chair*; Associate Professor Putallaz, *Director of Undergraduate Studies*; Professors Bettman, Blumenthal, Brodie, Carson, Coie, Craighead, George, Hamilton, Hasher, Martin Lakin, Maddox, Payne, Roth, Sheppard, Surwit, Thompson, Vidmar, and Williams; Associate

Professors Anderson, Curry, Day, Gil, Keefe, Linville, Lochman, Logue, and Spenner; Assistant Professors Fischer, Fredrickson, March, Mazuka, Serra, and Siegler; Professors Emeriti Alexander and Borstelmann; Assistant Professors of the Practice Musia Lakin and Terry; Research Professor Goldstein; Associate Research Professor Madden; Research Scholar Fairbank

A major or a minor is available in this department.

The major in psychology is cooperatively administered by the Department of Psychology: Experimental and the Department of Psychology: Social and Health Sciences. Faculty with appointments in both departments are listed only in their primary department. The director of undergraduate studies in either department guides all majors and all students interested in any psychology courses. However, Dr. Putallaz (director of undergraduate studies, social and health sciences) has primary responsibility for the personality and social and health tracks of the major, and Dr. R. Erickson (director of undergraduate studies, experimental) has primary responsibility for the biological and cognitive tracks of the major; either may be consulted by students with interests in the developmental track.

The *General Courses*, coded (G), apply as indicated. The *Biological Bases of Behavior* area, coded (B), includes courses on the nervous system, the learning process, motivation, neurochemistry, hormones, and other biological factors in their relationship to behavior. The *Cognitive Psychology* area, coded (C), includes the topics of sensation and perception, cognition, learning, language, memory, and psycholinguistics. *Developmental Psychology*, coded (D), emphasizes the developmental aspects of all psychological processes such as sensory and motor behavior, cognition, children's thinking and reasoning, and social behavior. *Health Psychology*, coded (H), involves study of behavioral implications of illness and health. The courses involve understanding sources and treatment of psychopathology due to stress, trauma, and disease. Courses in the *Personality/Social Psychology* area, coded (P), ultimately bear on the questions of human character and behavior, both normal and abnormal. These include personality, social and abnormal issues, along with strategies for the prevention of deviance.

11. Introductory Psychology (G). (SS) Biological bases of behavior, psychological development, cognitive psychology, personality, abnormal behavior, and social psychology. Designed as a broad introduction to psychology for nonmajors as well as majors; not required for the major. Students are expected to participate as subjects in three to six hours of psychological research. One course. *Holland or H. Schiffman*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

91. Biological Bases of Behavior: Introduction and Survey (B). (NS) Physiological, developmental, and evolutionary approaches to behavior. Sensory and cognitive processes, sleep, pain, emotion, hunger, and thirst as well as maternal and sexual behavior patterns. Students required to participate as subjects in three to six hours of psychological research if not done in a previous introductory class. Not open to students who have taken Psychology 103. Prerequisite: Biology 19, Biology 21L, or Biology 22L; may be taken concurrently. One course. *C. Erickson, Williams, or staff*

92. Cognitive Psychology: Introduction and Survey (C). (SS) Overview of cognitive processes including pattern recognition, concept formation, attention, memory, imagery, language, problem solving, and thinking. Emphasis both empirical and theoretical. Students required to participate as subjects in three to six hours of psychological research if not done in a previous introductory class. Not open to students who have taken Psychology 107. One course. *Day, Hasher, Rubin, or Serra*

97. Developmental Psychology: Introduction and Survey (D). (SS) Theory and research on growth and behavior from infancy to adolescence. Students required to participate as subjects in three to six hours of psychological research. Not open to

students who have taken Psychology 105. One course. *Goldstein, Mazuka, Needham, Putaliez, or staff*

98. Health Psychology: Introduction and Survey (H). (SS) The role of behavioral variables in the etiology, pathophysiology, and treatment of cardiovascular disease and endocrine disorders; psychoneuroimmunology; chronic pain; and life-style behaviors with health consequences such as smoking and eating disorders. Students required to participate as subjects in three to six hours of psychological research if not done in previous introductory class. Not open to students who have taken Psychology 109. One course. *Anderson or Gil*

99. Personality and Social Behavior: Introduction and Survey (P). (SS) The determinants of socially significant human behavior—those residing in the person, those that are the product of interpersonal context, and those resulting from the interaction of both sources. Formative as well as contemporary influences considered. Students participate in three to six hours of psychological research if not done in a previous introductory class. Not open to students who have taken Psychology 108. One course. *Costanzo, Fischer, Fredrickson, or staff*

101. Research Methods in Psychological Science (G). (NS, SS) A systematic approach to the problem of designing and conducting psychological research putting that research into a larger scientific context featuring both experimental and nonexperimental methods, including observational, archival, and case-study methods. Problems of validity and control. Analysis of theorizing coupled with examination of psychological constructs used in behavioral neuroscience, cognitive science, developmental psychology, sensation and perception, as well as psychological aspects of the social and health sciences. Prerequisite: one prior course in psychology. One course. *Meck*

102. Mind, Brain, and Computers (B, C). (NS) The ways in which computers and neural network models contribute to integrate the study of the mind with the study of the brain. Prerequisite: Psychology 11, 91, or 103. One course. *Schmajuk*

106. The Psychology of Women (P). (SS) The psychology of women in this country: development, including sex differences, separation and individuation, and achievement; sexuality; sex-roles; mental health problems particularly salient to women; cultural influences on female development; and views within the field of psychology about women. C-L: Women's Studies. One course. *Hamilton or Roth*

111. Learning and Adaptive Behavior (B, C). (NS) Principles of instrumental learning in animals and humans. Prerequisite: none, but some knowledge of quantitative science desirable. One course. *Higa*

112. Cognitive Neuroscience (C). (SS) Relating empirical findings in perception and cognition to structures and processes in the brains of animals and people. Emphasis on vision. Prerequisite: prior course in psychology. One course. *Lockhead*

114. Personality (P). (SS) Representative theories of personality from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. One course. *Staff*

115. Introduction to Learning Theory (C). (SS) Simple processes of learning, memory, and motivation, primarily nonhuman, from the perspectives of associationism, ethology, and cognitive science. One course. *Holland*

116. Social Psychology (P). (SS) Problems, concepts, and methods in the study of social interaction and interpersonal influence. C-L: Sociology 106 and Women's Studies. One course. *Costanzo, Fischer, or George*

117. Statistical Methods (G). (QR) Elementary statistical techniques and their application to the analysis and interpretation of social science data. Theory of inference is stressed. C-L: Sociology 133. One course. *Staff*

118. Special Topics in Social Psychology (P). (SS) Study of one broad area in social psychology; exact content area varies by semester. Possible areas include social cognition, social influence, and applied social psychology. Prerequisite: Psychology 99, 108, or 116. One course. *Costanzo or Fischer*

119. Abnormal Psychology (H, P). (SS) Disordered behavior and constructive personality change viewed in interpersonal and social context for purposes of understanding normal and abnormal personality development and functioning. One course. *Carson or Craighead*

120. Comparative Psychology (B). (SS) A survey of animal behavior from the psychologist's perspective. One course. *Holland*

121. Early Cognitive Development (C, D). (SS) Perceptual and conceptual development in humans from birth through early childhood. Topics include how infants and young children perceive the world, how they acquire knowledge about the world, and how they remember and use this knowledge over time. Prerequisite: Psychology 97 or 105. One course. *Needham*

122. Psychology of Thinking (C). (SS) An overview of high level cognitive processes. Topics include categorization, problem solving, decision making and human factors. Prerequisite: one previous psychology course. One course. *Serra*

123. Introduction to Human Memory (C). (SS) A review of the theoretical and empirical study of the encoding, storage, and retrieval of information. The development, pathology, and computer modeling of memory in clarification of basic process and applications. One course. *Hasher, Rubin, or Serra*

124. Human Development (D). (SS) Especially for sophomores. Juniors and seniors by consent only. See C-L: Interdisciplinary Course 124; also C-L: Human Development and Sociology 124. One course. *Anderson, Gustafson, and staff*

125. Memory and the Brain (B). (NS) Brain function in relation to the phenomenon of memory. Historical and current perspectives. One course. *Swartzwelder*

126. Behavior and Neurochemistry (B, P). (NS) The role of brain chemicals (neurotransmitters, peptides, and hormones) in behavior. Hypotheses addressing the neurobiology of mental disorders. Prerequisite: Psychology 91 or 103. One course. *Meck*

127. Drugs, Brain, and Behavior (B). (NS) Mechanisms by which psychoactive drugs act. Changes which occur with chronic use of drugs; drug abuse and dependence. Social and legal implications of psychoactive drugs. This course is designed for both science and nonscience majors. Prerequisites: introductory biology (Biology 21L, 22L) and chemistry (Chemistry 11L, 12L). C-L: Pharmacology 160. One course. *Kuhn*

128. Memory Disorders (C). (SS) Examines human memory disorders and their implications for cognitive theory practice. Topics include specific disorders such as head injury and Alzheimer's disease; memory complaints in normal people; and mnemonics and other methods used to bypass poor memory ability. Psychology 92 or 107, 123, or other courses in cognitive psychology are recommended as background for this course. One course. *Crovitz*

129. Psychology and the Law (P). (SS) The relationship between psychology and the legal system. Theory, empirical findings, and court cases in mental health law, including the insanity defense, competency to stand trial, and civil commitment. Use of social science data in several legal domains, including expert testimony in rape and

domestic assault trials, employment discrimination, and trademark infringement. Prerequisite: Psychology 99 or 108 or Psychology 116. One course. *Fischer*

130. Psychosocial Aspects of Human Development (D). (SS) The connectedness of societal, behavioral, and biological components of normal development from childhood through old age; society as the context in which individuals develop over the life span. Introductory work in anthropology, psychology, or sociology recommended. C-L: Human Development, Interdisciplinary Course 180, and Sociology 169. One course. *Staff*

131. Early Social Development (D). (SS) The developmental course of children's social behavior. The role that certain relationships (for example, mother, father, siblings, peers, friends) play in that development as well as the effects of other influences (for example, school, television, divorce, daycare). Prerequisite: Psychology 97 or 105. One course. *Putallaz*

133. Fundamental Issues in the Study of the Brain (B). (NS) Classic papers in the fields of systems, developmental, cellular, and molecular neurobiology. Prerequisite: Psychology 135. One course. *W. C. Hall*

134. Psychology of Language (C). (SS) Psychological "reality" of linguistic structures, language and cognition, biological bases, animal communication, language pathologies, nonverbal communication, language versus music, linguistic universals, and bilingualism. Everyday language phenomena (for example, slips of the tongue) as well as the experimental and theoretical literature. Psychology 92 or 107 desirable. C-L: Linguistics. One course. *Day*

135. Principles of Neurobiology (B). (NS) Prerequisites: Biology 21L and 22L, and Chemistry 12L or equivalent. See C-L: Biology 154. One course. *Nowicki*

136. Developmental Psychobiology (D). (SS) Early human social development, including the formation of social relationships, the origins of altruism and aggression, sex differences, peer relationships, and verbal and nonverbal communication patterns. Prerequisite: Psychology 91, 97, 103, or 105, or consent of instructor. One course. *Eckerman*

137. Adolescence (D). (SS) Adolescent development, including identity formation, intelligence, sexuality, peer and parent relationships, vocational choices, drugs, and psychopathology. Theory and empirical findings. One course. *Goldstein or staff*

139. Psychobiology of Motivation (B, D). (NS) The psychobiology of such concepts as motivation, drive, incentive, reward, and goal-directed behavior. The neural mechanism; developmental perspectives. Prerequisite: Psychology 91 or 103. One course. *Swithers*

142S. Child Observation (D). (SS) Observation of children in the group setting of the University Preschool and Primary Program. Aspects of personality, social development, and child-adult relationships. Open only to junior and senior psychology majors with consent of instructor. One course. *Musia Lakin*

150S. Hormones and Behavior (B, P). (NS) Behavioral neuroendocrinology of sexual differentiation, reproduction, emotion, feeding, learning, and memory in animals and humans. Prerequisite: Psychology 91 or 103. C-L: Women's Studies. One course. *C. Williams*

154S. Education, Children, and Poverty (D). (SS) Psychological hypotheses concerning the roles of preschool intervention programs, improved quality of resources, teacher expectancy effects, and enhancement of pupil self-confidence in relation to the goal of improved cognitive competence for poverty background children. Criteria for defining competence, such as scores on psychometric intelligence tests, performing on

Piagetian tasks, and development of specific skills. Interpretations concerning intelligence and cognitive deprivation in poor children in light of relevant psychological evidence. Prerequisite: one course in psychology or consent of instructor. One course. *M. Wallach*

157S. Life Span Analysis of Social Relationships (D, P). (SS) The developmental changes that occur in social relationships (for example, parent, sibling, peer) across the life span; the differing roles these relationships play in the development of the individual. Prerequisite: Psychology 97 or 105. One course. *Putallaz*

158S. Sleep: Its Nature and Function (B). (NS) Explores the phenomena of sleep over the full range of biological and psychological aspects. Function of sleep and consequences of sleep loss and change. Sleep disorders. Prerequisite: Psychology 91 or 103. One course. *Marsh*

159S. Biological Psychology of Human Development (B, D, H, P). (SS) Multidisciplinary perspectives bearing on key processes in human development from infancy through old age; the way that biological and psychological processes act together in normal and pathological behavior and development. Clinical case material and videotapes. Preference given to senior psychology majors and to students in the Program in Human Development. Consent of instructor required. One course. *Thompson*

162S. Clinical Issues: Conceptions, Techniques, and Problems of Professional Clinical Psychology (H, P). (SS) Assessment of personality and psychopathology. Consultation and psychotherapy in individuals, groups, family, and organizational contexts. Research on clinical questions. Intended for those contemplating advanced graduate or professional study and careers in clinical psychology, counseling, psychiatry, social work, or cognate fields. Prerequisites: junior or senior status and consent of the instructor. One course. *Martin Lakin*

165S. Neurobiology of Learning and Memory (B). (NS) Readings in the neurophysiological and neurochemical underpinnings of the memory process. Current and classical research and review articles. Prerequisite: Psychology 91 or 103. One course. *Stewartzelder*

167S. Brain Mechanisms of Behavior (B, C). (NS) General physiological principles of brain organization in relation to behavioral processes from sensation to concept formation. Discussions of original readings from seminal papers in the early nineteenth century to the present. Prerequisite: Psychology 91 or 103. One course. *R. Erickson*

168S. Body, Brain, and Auditory Perception (B). (NS) Sensory and perceptual adaptations by species to facilitate processing of stimuli. A comparative study of the relations between specialized auditory perceptual mechanisms found in different species and the acoustic environment which ostensibly produced these unique adaptations. Prerequisite: Psychology 91 or 103. One course. *Smith*

169S. Eating Behavior and Disorders (B). (SS) The interaction of taste and smell with obesity, anorexia, and nutritional status including that of the elderly. Prerequisite: Psychology 91 or 103. One course. *S. Schiffman*

170S, A-R, U-Z. Selected Problems. New courses not yet in the bulletin are designated as 170S or 270S depending on their level. Since all faculty offer these courses, their contents vary accordingly. Different courses indicated by the letter. One course. *Staff*

171T, A-R. Tutorials. Small group discussions about influential books and articles in psychology. The availability of tutorials, their content, and the instructors will be announced before registration. Consent of instructor required. Pass/fail grading only. Half course. *Staff*

173S. Theoretical Issues in General Psychology (C, D, P). (SS) In-depth consideration of certain issues that cut across different areas of psychology: Are human beings bound to act in their own interests, or can they be genuinely altruistic? What do we mean when we talk about the mind or mental states, how do we know about these states in others as well as ourselves, and how are these states related to the body? Is psychology a science? Should it try to be, can it be, a science? One course. *L. Wallach*

174S. Infancy (C, D, P). (SS) Covers perceptual, cognitive, social, and motor development during the first two years of life, with a focus on the connections between developments in these four areas. Prerequisites: Psychology 97 or 105 and one other psychology course. One course. *Eckerman or Needham*

175S. Psychophysiology (B). (NS) How emotional and cognitive processes are expressed physiologically, and how this can be used to understand how the brain works. Special attention given to how electrical activity of the brain is related to memory, selective attention, and decision making. A course in biological psychology (for example, Psychology 91) provides the proper background, but is not required. One course. *Marsh*

176S. Great Ideas in Psychology (C). (SS) Ideas in psychology drawn from various content areas (for example, perception, personality, motivation, biological bases, social, cognitive, developmental, learning, clinical) and various methodological approaches (for example, experimental, introspection, observation, interview, longitudinal, simulation). Not open to students who have taken Psychology 204S. Prerequisites: junior or senior psychology-major status and consent of instructor. One course. *Day*

177S. Human Sexuality (B). (NS) The biological, endocrinological, and physiological correlates of human sexual behavior including sexual differentiation, pubertal development, adult male and female sexual behavior, premenstrual syndrome, menopause, sexuality and aging, homosexuality, and deviant sexual behavior. Prerequisite: Psychology 91 or 103 or background in biology. One course. *Izard*

178S. The Psychology of Exceptional Ability (C, D). (SS) Examines various approaches to the study of exceptional intellectual, cognitive, academic, and artistic abilities, with an emphasis on children and adolescents traditionally referred to as gifted, talented, or precocious. Psychosocial and emotional aspects and consequences of exceptional ability. The Duke University Talent Identification Program (TIP) will be a focus as well as a resource. Prerequisites: courses in either developmental or cognitive psychology and statistics recommended. One course. *Goldstein*

180S. Advanced Topics in the Psychology of Gender (P). (SS) Study of one broad domain in the psychology of gender, exact content area to vary by semester. Emphasis on how gender influences human experience and behavior. Possible areas include theory of gender differences; victimology; gender role socialization; psychological issues in marriage, sexuality, and parenthood; biosocial aspects of gender; gender and mental health; and achievement. Prerequisites: Psychology 106 and consent of instructor. C-L: Women's Studies. One course. *Fischer, Fredrickson, Hamilton, or Roth*

181A, S. Methods in Behavioral Neurobiology (B). (NS) Research in neural bases of behavior using simple biological systems as models for more complex behavior. Laboratory experience in experimental methodologies. Observational techniques in study of natural behaviors and neurophysiological recording and stimulation. Not open to students who have had Psychology 149S. Prerequisites: Psychology 91 or 103 or background in biology, and consent of instructor. One course. *W. G. Hall or Swithers*

181B, S. Research Methods in Animal Learning (B, C). (NS) Behavioral experiments with rats and pigeons. Basic tools and methods used in study of animal learning (experimental design, methodology, data analysis, basic theoretical interpretation of results.) Prerequisite: Psychology 111 or 115 strongly recommended. One course. *Higa*

182A, S. Cognitive Laboratory (C). (SS) Human cognition; language, memory, problem solving, and other higher mental processes. Not open to students who have had Psychology 143S. Prerequisite: Psychology 92 or 107 or 112 or 123. One course. *Hasher, Lockhead, Rubin, or Serra*

182B, S. Perception Laboratory (C). (SS) Experimental approaches to basic phenomena of perception as determined by conditions in the external situation and the person: biological and psychological. Not open to students who have had Psychology 148S. Prerequisite: Psychology 112 or consent of instructor. One course. *Lockhead*

182C, S. Neural Networks and Psychology (B, C). (NS) Several neural networks applied to perception, learning, and cognition. Neural architectures including adalines, perceptron, backpropagation, autoassociative nets, Boltzman machines, reinforcement nets, competitive learning, and adaptive resonance theory. Computer simulations of the different networks. Prerequisites: Mathematics 31 and 32. One course. *Schmajuk*

183A, S. Research Methods in Developmental Psychology (D). (SS) Students who have had Psychology 140S not eligible for enrollment. Prerequisite: Psychology 97 or 105 or consent of instructor. One course. *Eckerman or L. Wallach*

184A, S. Research Methods in Health and Clinical Psychology (H). (SS) Contemporary approaches to psychologically based research in health and mental health. Survey, laboratory, and/or narrative self-report methodologies. Class research projects. Not open to students who have taken Psychology 146S. Prerequisites: Psychology 98 or 109, and Statistics 110 or the equivalent. One course. *Blumenthal or Keefe*

185A, S. Experimental Approaches to Personality (P). (SS) Methods applied to personality research. Not open to students who have taken Psychology 145S. Prerequisite: one course in psychology. One course. *M. Wallach*

185B, S. Research Methods in Social Psychology (P). (SS) Study of empirical research methods used to study contemporary issues in social psychology, including both experimental and nonexperimental strategies. Not open to students who have taken Psychology 147S. Prerequisite: Psychology 99, 108, or 116. One course. *Fredrickson*

186A, S. Measurement of Individual Differences (B, C, D, H, P). (SS) Theory and assessment. Historical development and modern treatment of the individual differences tradition in psychology from a variety of subdisciplines: psychophysics, theories of intelligence, personality assessment, and clinical diagnoses. Nature-nurture controversy contemplated from individual differences framework, suggesting various solutions to seemingly paradoxical evidence. How modern views of psychological measurement may shed new light upon old controversies. Not open to students who have taken the former Psychology 118. Prerequisite: Psychology 117, Statistics 110, or equivalent. One course. *Terry*

189S. Building the Brain. (NS) Recommended background: Psychology 103, Biology 154, Biology 21L and/or Biology 22L. Open only to juniors and seniors. See C-L: Distinguished Professor Course 189S; also C-L: Human Development, Neurobiology 189S, and Neurosciences. One course. *Purves*

190S. History of Modern Psychology (B, C, D, H, P). (SS) Major developments in psychology from the late nineteenth century to the present, with emphasis on the history of ideas. The experimental beginnings of psychology as a science, psychoanalysis, evolutionary thinking, behaviorism, cognitive psychology, and the psychology of social issues. Prerequisite: prior course in psychology or consent of instructor. One course. *H. Schiffman or L. Wallach*

191, 192, 193, 194. Independent Study. Directed reading and research. 191, 192: junior year fall, spring; 193, 194: senior year fall, spring. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

For Advanced Undergraduates and Graduates

202S. Autobiographical Memory (C). (SS) A review and critical analysis of the literature, theory, and empirical study of autobiographical memory within cognitive psychology. Consent of instructor required. One course. *Rubin*

203S. Seminar in Cognitive Neuroscience (C). (SS) Relating empirical findings in perception and cognition to structures and processes in the brains of animals and people. Emphasis on vision. Consent of instructor required. One course. *Lockhead*

205S. Children's Peer Relations (D). (SS) An examination of the empirical literature with emphasis on the functions that peers serve for children, the developmental course of these relationships, the clinical ramifications and possible explanations for inadequate peer relations (including an examination of the family's role), and interventions used to improve children's relationships with their peers. Consent of instructor required. One course. *Putallaz*

206S. Pediatric Psychology (H). (SS) The conceptual and methodological bases for the field. Case material illustrating how developmental, biological, and psychosocial processes act together in child health and illness. Focus on adjustment and coping with illness and treatments related to cystic fibrosis, sickle cell disease, cancer, diabetes, and seizure disorders. Consent of instructor required. One course. *Thompson*

207S. Topics in Psychobiology (B, H). (NS) The biological substrates of human behavior in health and disease. Drug abuse, alcoholism, depression, schizophrenia, and human aggression. Films and videotapes. Student presentations; patient interviews. Prerequisites: senior standing and consent of instructor. C-L: Distinguished Professor Course 207S. One course. *Brodie*

208S. Emotion (P). (SS) An analysis of theoretical and empirical approaches to understanding emotions, with an emphasis on the functions emotion serves in people's lives. Both classic and contemporary research literatures. Prerequisites: Psychology 99 or 108 and consent of instructor. C-L: Women's Studies. One course. *Fredrickson*

209S. The Cognitive Psychology of Oral Traditions (C). (SS) The structure of songs and genres from oral traditions and the processes used in their composition, transmission, and recall, analyzed from the perspective of cognitive psychology. Consent of instructor required. One course. *Rubin*

210S. Cognition (C). (SS) Schematic view of cognitive psychology plus intensive study of two to three specific research topics such as forms of representation, individual differences, and problem-solving models. Emphasis on alternative experimental and theoretical approaches. Prerequisites: Psychology 92 or 107 and consent of instructor, or graduate status. One course. *Day*

211S. Neural Development and Comparative Cognition (B, C). (NS) Current research on neural development of cognitive processing in several sensory systems (for example, auditory, visual, and olfactory systems), and in several species (for example, aplysia, song birds, rats, cats, monkeys, and humans) with regard to how attention and memory processes develop. Both the normal ontogeny of cognitive ability and differentiation that is altered during an early sensitive period of development. Prerequisites: three courses in biological psychology and consent of instructor. One course. *C. Williams*

212S. Human Memory (C). (SS) Classical and modern literature, data, and theories relating to mechanisms of information processing, storage, and retrieval. Prerequisite: consent of instructor or graduate status. One course. *Hasher or Rubin*

214S. Development of Social Interaction (D, P). (SS) Major concepts and methods pertaining to early social development, emphasizing human social behavior and a developmental psychobiological approach. Consent of instructor required. One course. *Eckerman*

217S. Advanced Social Psychology (P). (SS) Theoretical and empirical approaches to understanding socially significant human behavior and experience. Review of classic and contemporary research literatures, with an emphasis on applied issues. Prerequisites: Psychology 99 or 108, and 147S, and consent of instructor. C-L: Women's Studies. One course. *Costanzo, Fischer, or Fredrickson*

218S. Personality, Stress, and Disease (H, P). (SS) The interaction between person and social environment as a contributor to development of physical disease. Both epidemiological and laboratory-based research considered. Prerequisite: Psychology 98 or 109, consent of instructor, or graduate status. One course. *Williams*

223S. Animal Learning and Cognition: A Neural Network Approach (B, C). (NS) Several connectionist theories of animal learning and cognition. Neural network theories of classical conditioning; the concepts of models of the environment, prediction of future events, reliable and salient predictors, redundancy reduction, competition for limited capacity short-term memory, mismatch between predicted and observed events, stimulus configuration, inference generation, modulation of attention by novelty, and timing. Neural networks of operant conditioning; the concepts of goal-seeking mechanisms, response-selection mechanisms, and cognitive mapping. How neural network models permit simultaneous development of psychological theories and models of the brain. Prerequisites: Mathematics 31 and 32, Psychology 111 and 115, and consent of instructor. One course. *Schmajuk*

224S. Timing and Time Perception (B, C). (NS) Selected topics dealing with the psychobiological bases of internal clocks used to time in the-seconds-to-minutes range. Impact of neural pacemakers systems on cognitive processes involved in divided attention, temporal memory, and the determination of the quantal unit of time and/or consciousness. One course. *Meck*

227S. Behavioral Physiology: Basic Systems (H, P). (SS) Organ systems review of physiology, emphasizing the role of the central nervous system and behavior in physiological function. Prerequisites: for undergraduates—consent of instructor and Psychology 91 or 103 or 159S. One course. *Surwit*

228S. Behavioral Physiology: Stress and Disease (H, P). (SS) Physiological processes involved in stress and coping; effects on nervous, cardiovascular, immune, and endocrine systems; how stress influences various disorders, that is, depression, cardiovascular disease, and diabetes. Prerequisites: for undergraduates—consent of instructor; Psychology 98 or 109, 159S, and 227S. One course. *Surwit*

230S. Social Behavior of Animals (B, D, P). (NS) Developmental, ecological, and physiological aspects of territorial, sexual, parental, and aggressive behavior. Consent of instructor required. One course. *C. Erickson*

234S. Advanced Personality (P). (SS) Selected topics of current interest concerning empirical research on personality. Strategies for the definition of research questions and the evaluation of research progress. Prerequisite: consent of instructor or graduate status. One course. *M. Wallach*

255S. Life-Span Development (C, D, P). (SS) Analysis of development across the life span. Origins and course of cognitive and emotional development; components of personality and social development. Applications to models of both normative and pathological development. Prerequisites: Psychology 97 or 105, and consent of instructor. One course. *Costanzo or Goldstein*

261S. Advanced Learning Theory (C). (SS) Selected topics in the data and theory of basic processes of learning, memory, and motivation in animals and humans. Emphasis on the nature of theory construction and evaluation, and the relation of current perspectives to older ones. Consent of instructor required. One course. *Holland*

262S. Minority Mental Health: Issues in Theory, Treatment, and Research (P, H). (SS) Survey and discussion of theoretical, research, and clinical issues in minority mental health with special emphasis on African-Americans. Prerequisites: Psychology 119 and consent of instructor. One course. *Anderson*

264S. Gender, Hormones, and Health (P, H). (SS) Hormone effects on behavior in animals and humans with topics including pubertal, menstrual-cycle, sex-related, and gender-related effects on mood, behavior, cognition, and health. Prerequisites: consent of instructor and junior or senior status. C-L: Women's Studies. One course. *Hamilton*

270S, A-R, U-Z. Selected Problems. New courses not yet in the bulletin are designated as 170S or 270S depending on level. Since all faculty offer these courses, their contents vary accordingly. Different courses indicated by the letter. One course. *Staff*

273. Statistics I (G). (QR) Foundations of probability and statistical inference. Introduction to the general linear model via multiple regression. Emphasis on application via statistical computing with SAS. Prerequisites: for undergraduates—consent of instructor and Psychology 117 or equivalent. One course. *Terry*

274. Statistics II (G). (QR) Basic and advanced ANOVA models via the GLM. Broad-based overview of multivariate models, including MANOVA, canonical correlation, discriminant analysis, and factor analytic models. Emphasis on application and use of computer packages. Prerequisites: for undergraduates—consent of instructor; Psychology 117 or equivalent and Psychology 273. One course. *Terry*

280S. History and Systems of Psychology (B, C, D, H, P). (SS) The birth, course, present, and future of psychology from the ancient philosophers to neural networks and neuroanatomy. Prerequisites: consent of instructor and Psychology 11, 91, 92, 97, 98, 99, 103, 105, 107, 108, or 109. One course. *Serra*

288S. Advanced Topics in Social Science and Law (P). (SS) Study of one broad domain in social science and law; exact content area to vary by semester. Emphasizes how empirical findings in social science are translated and used by the legal system. Possible areas include women's legal issues, family violence, expert testimony, employment discrimination. Prerequisites: Psychology 129 and consent of instructor. One course. *Fischer*

COURSES CURRENTLY UNSCHEDULED

110. Applied Psychology (P). (SS)

132. Cognitive Aspects of Human Development (C, D). (SS)

138. Language Development (C, D). (SS)

151S. Child Clinical Psychology (D, P). (SS)

152S. Community Psychology (D, P). (SS)

153S. Issues in Language Development (C, D). (SS)

- 163S. Stress and Coping (H, P). (SS)**
- 172S. Pain: Coping and Adaptation (H). (SS)**
- 215S. Cognitive Development (C, D). (SS)**
- 220S. Psycholinguistics (C). (SS)**
- 289S. Psychology of Prevention (P). (SS)**

THE MAJOR

For the A.B. Degree

Major Requirements. Ten courses in psychology (eight of which must be at the level of 100 or above) are required for the major, which is devised to provide depth and breadth, a small group course in psychology, and familiarity with the quantitative methods involved in psychology. For breadth, the student is required to take two introductory and survey courses including: (1) either 91 (Biological Bases of Behavior) or 92 (Cognitive Psychology), and (2) 97 (Developmental Psychology), 98 (Health Psychology), or 99 (Personality and Social Behavior). These introductory and survey courses define five areas of concentration in psychology as listed above. For depth, the student is required to take at least two courses in one of these areas in addition to the introductory course in that area of concentration. For instruction in small groups, the student is to take at least one seminar (number 140S and above, including 200-level courses). It is advisable that this seminar be in the student's area of concentration. For quantitative techniques used in psychology, the student is to take one of the following: Mathematics 136; Sociology 133; Statistics 110, 112, 113, 210B, 213; or Psychology 117. Each of these courses counts towards the ten courses required of the major. Each student will be introduced to the methods used in psychology by taking one of the following courses: Psychology 101, or one of the 180-series laboratory courses.

A student guidebook describing the curriculum in detail is available from the director of undergraduate studies. Of the ten psychology courses required for the major at least eight must be taken in the department at Duke; others, if approved, may count toward the 34 credits needed for graduation.

For the B.S. Degree

As for the A.B. degree, with the following additions: (1) Mathematics 32 or equivalent; (2) six natural science courses in at least two of the following (mathematics/natural science) departments: mathematics (100-level or above, in addition to the statistics requirement, above), computer science (100-level or above), chemistry, physics, biological anthropology and anatomy, and biology; (3) at least three of the six mathematics/natural science courses must be numbered 100 or higher; (4) at least one course that involves extensive laboratory or fieldwork (for example, experimental methods or independent research).

THE MINOR

The minor is fulfilled with five courses in psychology including the breadth requirement of two introduction and survey courses and the depth requirement of two more courses following one of these introduction and survey courses as described above for the major, plus one elective course.

Neurosciences Concentration within B.S. Degree

Students completing a B.S. in psychology may elect to fulfill the requirements for a specialized concentration in neuroscience within the psychology major. Completion of that concentration would be indicated on the official transcript. For information contact

the office of the Neuroscience Program and the director of undergraduate studies in psychology.

Human Development Program

Students completing a B.S. or B.A. in psychology who are interested in human development may elect to fulfill the requirements for a Human Development Program certificate. The goal of this interdisciplinary program is to foster an understanding of how biological, psychosocial, and cultural processes act together in development throughout the life course, and of the complementarity of disciplinary perspectives. Completion of the program certificate would be indicated on the official transcript. For information contact the Director of the Human Development Program, Professor Thompson.

Relation to Other Departments and Programs

Many psychology courses count toward concentrations in other areas as well as neurosciences and human development, for example, the certificate in early childhood education studies, the animal behavior concentration in the biology major, and the primatology concentration in the biological anthropology and anatomy major.

Independent Study

A program of individualized readings or an empirical research project may be carried out by arrangement with a faculty supervisor and enrollment in Psychology 191-194. A written plan of the program must be approved by the supervisor and the director of undergraduate studies. Credit for 191-194 may be recorded either as pass/fail or by means of letter grades. At most only one of these independent study courses may count toward the area of concentration requirement, and only two may count toward the major.

Honors \ Distinction

The graduation with distinction program and the honors by honors project program are each based on a special project, usually independent studies, the written form of which is reviewed by a committee composed of three members including the faculty mentor. For Graduation with Distinction, the student must have a 3.0 overall grade point average and a 3.5 grade point average in psychology; application must be made by the student one month prior to graduation. For honors by honors project, the student participates in a two-semester program; early in the first semester the individual project plans are presented to the group of honors students, and late in the second semester the results are presented. May graduates will register for this program in the spring of their junior year, and December graduates will register in the fall of their junior year. The student must have at least a 3.3 overall grade point average and 3.3 in psychology to enter the program. Upon successful completion of the program, it is possible that those with a grade point average between 3.3 and 3.4 may receive *cum laude*, those between 3.4 and 3.7 may receive *magna cum laude*, and those between 3.7 and 3.9 may receive *summa cum laude*. Those with a grade point average of 3.5 in psychology are additionally eligible for graduation with distinction.

Public Policy Studies (PPS)

Professor Ascher, *Chair*; Assistant Professor Smith, *Director of Undergraduate Studies*; Professors Barber (political science), Behn, Clotfelter, Cook, Fleishman (law), Garson (pediatrics and medicine), Healy (environment), Hough (political science), Ladd, Magat (business), Mickiewicz, Pearsall (engineering), and Price (political science); Associate Professors Conrad, Litzel, Lipscomb, and McConahay; Assistant Professors Gentry (economics), Hamilton, Korstad, Mayer, Miller, Miranda, Sprinkle (pediatrics), and

Stangl (statistics); Professors of the Practice Boothby, Broder, Brown, Harris, Sanford, and Stubbing; Visiting Professor Grummon; Visiting Associate Professor McElroy; Visiting Assistant Professor Ramachandran; Visiting Professor of the Practice Geller; Visiting Assistant Professor of the Practice Rudy; Adjunct Associate Professor Arcia; Senior Research Scientist Vaupel; Lecturers O'dor and Payne; Visiting Lecturers Ammarell, Bates, Berry, Besse, Blount, Bolch, Bovbjerg, Boyd, Brown, Devine, Dorsen, Dyer, Eudy, Feinstein, Frey, Fulton, Gulley, Harkness, Henderson-James, Lampert, Lin, Pankratz, Prak, Reid, Rosenberg, Shaikun, Stevens, and Yeoman

A major is available in this department.

Courses in public policy are open to all students providing that any prerequisites are met.

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

55D. Introduction to Policy Analysis. (SS) Basic concepts of analytical thinking including quantitative methods for assessing the probabilities of outcomes and appraising policy alternatives. Illustrated by problems faced by busy decision makers in government, business, law, medicine. One course. *Hamilton, Leitzel, Lipscomb, Mayer, or Miller*

100A. Duke in Brussels. (SS) See C-L: Political Science 100N; also C-L: Comparative Area Studies. Variable credit. *Grieco*

107. Environmental Politics and Policies in the Industrial World. (SS) See C-L: Political Science 107; also C-L: Comparative Area Studies. One course. *McKean*

110. Economic Analysis for Public Policy-Making. (SS) Application of microeconomic analysis to public policy areas, including agriculture, housing, taxation, and income redistribution. (Not open to students who have taken Economics 149, which also fulfills Public Policy Studies microeconomic requirement.) Prerequisite: Economics 52D or equivalent. One course. *Clotfelter, Conrad, Cook, Ladd, Leitzel, Lipscomb, or Miranda*

114. Political Analysis for Public Policy-Making. (SS) Analysis of the political and organizational processes which influence the formulation and implementation of public policy. Alternative models. Prerequisite: Political Science 90A, 91, 101, or equivalent. C-L: Political Science 145. One course. *Ascher, Hamilton, Mayer, Mickiewicz, Miller, or Smith*

116. Policy Choice as Value Conflict. (SS) Theoretical and practical problems in decision making in relation to conflicts of value and of interest. The manifestation of norms deriving from professional ethics, ideology, law, and other sources in such policy issues as welfare, environmental management, and national defense. One course. *Korstad, Payne, or Rudy*

116D. Policy Choice as Value Conflict. (SS) Same as Public Policy Studies 116 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Payne*

130S. Voluntary Organizations and Social Policy. (SS) The role of voluntary organizations in political advocacy, citizen representation, and social welfare policy. C-L: Political Science 130S. One course. *Smith*

142S. Chinese Economy in Transition. (SS) Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. See C-L: Economics 142S. One course. *Yang*

143D. Environmental Politics Beyond Borders (B). (SS) See C-L: Political Science 148D; also C-L: Comparative Area Studies. One course. *McKean*

145D. Leadership, Policy, and Change. (SS) Ethical and practical problems of leadership, including motivation, organizational morale, and strategies for large-scale

change. Historical and modern case studies, literary examples, and political and psychological theory. One course. *Boothby or Payne*

146S. Leadership and Judgment. (SS) Theoretical and experiential foundation for the exercise of judgment and leadership in policy-making. Readings, in-class exercises, and a major leadership project within either the Duke or Durham community. Consent of instructor required. One course. *Staff*

147. Environmental Politics and Policies in the Developing World. (SS) See C-L: Political Science 147; also C-L: Comparative Area Studies. One course. *McKean or Miranda*

148S. Environmental Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 149S. Variable credit. *Staff*

149S. United States Environmental Policy. (SS) An overview of the major environmental legislation in the United States. Topics include: air and water pollution, hazardous waste, agriculture, wildlife, and institutions. Political, economic, ethical, and scientific analysis. Consent of instructor required. One course. *Besse or Miranda*

151. Administration of Justice. (SS) Analysis of policy problems and conflicts involved in the operation of the criminal justice system. Consent of instructor required. One course. *Devine*

152S. Administration of Justice, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 151S. Variable credit. *Staff*

154S. Free Press and Public Policy. (SS) Policy problems and conflicts involved in applying First Amendment principles to print and electronic journalism. Topics include libel, privacy, national security, fair trial, and antitrust. Consent of instructor required. C-L: Film and Video. One course. *Stevens*

155S. Free Press and Public Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 154S. Variable credit. *Staff*

157. Health Policy. (SS) Analysis of health care problems and policies. Consent of instructor required. One course. *Henderson-James*

158S. Health Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 157S. Variable credit. *Staff*

159. State and Local Public Policy. (SS) How state and local governments pay for public services. Financing education and transportation programs, the use of municipal bonds for capital projects, the design of intergovernmental aid programs, and state and local tax policy. Consent of instructor required. One course. *Ladd or Smith*

160. Nonrenewable Resource Economics and Public Policy. (SS) Microeconomic analysis of nonrenewable resources. Resource scarcity and economic interpretations of doomsday models. Rationale for government intervention into natural resource markets and the effects of governmental policies on investments, rates of extraction, and conservation. Prerequisite: Economics 149. C-L: Economics 160. One course. *Conrad*

161S. State and Local Public Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 159S. Variable credit. *Staff*

163S. Telecommunications Policy and Regulation. (SS) Broadcast policies, the rise of cable television, spectrum allocation and authorization, and developments in common carrier telecommunications. Consent of instructor required. C-L: Film and Video. One course. *Prak*

164S. Telecommunications Policy and Regulation, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 163S. Variable credit. *Staff*

165. American International Economic Policy. (SS) Prerequisites: Economics 1D or 51D and 2D or 2S or 52D. See C-L: Economics 165. One course. *Bronfenbrenner*

167. International Policy. (SS) Relationships among organizations and agencies involved in international political and economic affairs, focusing on selected problems of international policy. Consent of instructor required. One course. *Ascher, Kuniholm, Leitzel, or Mayer*

168S. International Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 167S. Variable credit. *Staff*

175S. The Palestine Problem and United States Public Policy. (CZ) Identification of Arab and Zionist perceptions, alternatives available to American decision makers, interest group pressures on United States policies, historical analysis as a means to improve public policy. C-L: Comparative Area Studies and History 159S. One course. *Kuniholm*

176S. American Communities: A Photographic Approach. (SS) A documentary approach to the study of American communities through individual photographic projects centered around a community of the student's choosing. Consent of instructor required. C-L: Art 118S and Film and Video. One course. *Harris or Sartor*

177S. Advanced Documentary Photography. (SS) An advanced course for students who have taken Public Policy Studies 176S or have had substantial experience in documentary fieldwork. Students complete an individual photographic project and study important works within the documentary tradition. Prerequisite: Art 118S, Public Policy Studies 176S, or consent of instructor. C-L: Art 119S. One course. *Harris*

179S. Refugees and World Politics. (SS) Examination of refugee issues in the context of domestic and international political environments. Focus on the interplay among political, social, economic, cultural, and psychological phenomena as governments of host countries, international and nongovernmental organizations, and the refugees interact in the context of ongoing crises in Africa, Southeast Asia, Central America, and the United States. C-L: Comparative Area Studies. One course. *Boothby*

180S. Writing for the Media. (SS) Workshop on writing news stories, editorials, and features for the print media. Consent of instructor required. C-L: Film and Video. One course. *Bolch or Reid*

181S. Advanced News Reporting. (SS) Students report, write, and rewrite six in-depth stories during the semester. Assignments designed to explore investigative reporting techniques and the issues that arise in writing longer, more complex stories. Prerequisite: Public Policy Studies 180S or consent of instructor. One course. *Bates and Yeoman*

187S. The Canadian Health Care System. (SS) See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 185S, Economics 185S, History 108E, Political Science 185S, and Sociology 185S. One course. *Boychuck or LeClerc*

188. The Psychology of Political Symbols. (SS) See C-L: Political Science 188. One course. *McConahay*

190. Internship. For students working in a public agency, political campaign, or other policy-oriented group under the supervision of a faculty member. Prior consent

of assistant director of internships, placement, and alumni and director of undergraduate studies required. Pass/fail grading only. One course. *Staff*

191, 192. Independent Study. Directed reading and research. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. One course each. *Staff*

195S, 196S. Selected Public Policy Topics. One course each. *Staff*

197. Marine Policy. (SS) Formal study of policy and policy-making concerning the coastal marine environment. History of specific marine-related organizations, legislation, and issues and their effects on local, regional, national, and international arenas. Topics explored through use of theoretical and methodological perspectives, including political science, sociology, and economics. Consent of instructor required. (Given at Beaufort.) C-L: Environment 276 and Marine Sciences. One course. *Orbach*

For Seniors and Graduates

216S. Economics of Education. (SS) Prerequisite: Economics 149 or Public Policy Studies 110. See C-L: Economics 216S. One course. *Clotfelter*

218. Macroeconomic Policy. (SS) Survey of macroeconomic theory and analysis of policies designed to reduce unemployment, stimulate economic growth, and stabilize prices. Conventional monetary and fiscal instruments, employment policies, and new policies designed to combat inflation. C-L: Economics 218. One course. *Leitzel or McElroy*

222. Statistics and Data Analysis for Policymakers. (QR) Not open to students who have had Mathematics 136 or Statistics 110A, 110B, 112, 113, 114, 210B, or 213. See C-L: Statistics 210A. One course. *Stangl*

236. Public Management I: Managing Public Agencies. (SS) Operations management, information and performance, personnel management, public sector marketing. One course. *Behn or Yaggy*

238. Public Budgeting and Financial Management. (SS) Fund accounting for government; techniques of financial analysis, including break-even analysis, cost accounting, cash-flow analysis, and capital budgeting; and governmental budgeting, including the budgetary process and reforms, and the budget crunch in the public sector. One course. *Stubbing*

241. Reporting the American People. (SS) Critical analysis of the sources of information the media rely upon in reporting opinion and policy preferences: opinion polls, bellwethers, informed elites. Includes the design and execution of a public opinion poll on a topic of local or national interest. One course. *McConahay*

242S. Chinese Economy in Transition. (SS) Prerequisites: Economics 1D or 51D, and 2D or 2S or 52D. See C-L: Economics 242S. One course. *Yang*

243. Soviet and Post-Soviet Political Communication. (SS) Analysis of policy, content, and audiences of mass media in the Soviet Union and the successor republics, principally Russia. Focus on such issues as media access, media markets, television and electoral campaigns, and relationship to political authority. C-L: Political Science 276. One course. *Mickiewicz*

251S. Regulation of Vice and Substance Abuse. (SS) Focus on activities that have traditionally been defined as vices (including drinking, smoking, use of opiates, gambling, pornography, prostitution) and the problems of regulating and controlling them in a free society. Evaluation of social costs and benefits of various alternative policy

interventions. Prerequisite: Economics 149 or Public Policy Studies 110. C-L: Economics 251S. One course. *Cook*

253. The Politics of Health Care. (SS) The history, status, and future of health care policy. Grounded in political theories such as distributive justice, altruism, and contractarianism. Focus on policy formation. Case discussions of American reform controversies in light of international experience. C-L: Political Science 249. One course. *Sprinkle*

255. Health Policy Analysis. (SS) Group analysis of a current health-policy problem. Project involves background research, data acquisition, analysis, writing, and presentation of a substantial policy report. Designed for candidates seeking the undergraduate certificate in health policy. Consent of instructor required. One course. *Boychuk*

256. The Economics of Health Care. (SS) The health care industry and government policies designed to alter market demand and supply relationships: national health insurance, the relationship between insurance, supply constraints, and inflation; the supply and distribution of health manpower; hospital cost containment policy. Prerequisite: Economics 149 or the equivalent or consent of instructor. One course. *Lipscomb*

257. United States Policy in the Middle East. (SS) From World War II to the present with a focus on current policy options. C-L: Comparative Area Studies. One course. *Kuniholm*

258. International Environmental Regimes. (SS) See C-L: Political Science 271; also C-L: Comparative Area Studies. One course. *McKean*

259S. State and Local Public Finance. (SS) Analysis of state and local revenue sources, intergovernmental fiscal relations, budgets and expenditures, fiscal aspects of economic development, and the municipal bond market. Policy topics include financing schools and transportation systems, tax policy, and current fiscal issues. Prerequisite: Public Policy Studies 217 or equivalent. C-L: Economics 259S. One course. *Ladd*

260. Economic Policy Analysis of Nonrenewable Resources. (SS) Economic analysis of nonrenewable resources, development, and exploration. Relationship between natural resources and other economic sectors. Emphasis on public policy tax and regulatory policy, natural resources in developing economies and foreign investment in the mining sector. Prerequisite: Economics 149, Public Policy Studies 110, or Public Policy Studies 232. C-L: Economics 260. One course. *Conrad*

261. Evaluation of Public Expenditures. (SS) Basic development of cost benefit analysis from alternative points of view, for example, equity debt, and economy as a whole. Techniques include: construction of cash flows, alternative investment rules, inflation adjustments, optimal timing and duration of projects, private and social pricing. Adjustments for economic distortions, foreign exchange adjustments, risk and income distribution examined in the context of present value rules. Examples and cases from both developed and developing countries. C-L: Economics 261 and Environment 272. One course. *Conrad*

262S. Seminar in Applied Project Evaluation. (SS) Initiate, develop, and perform a project evaluation. Range of topics include measuring the social cost of deforestation, the B1 Bomber, a child nutrition program, the local arts program. Prerequisite: Economics 285 or Public Policy Studies 261. C-L: Economics 262S. One course. *Conrad*

264S. Research Seminar: Topics in Public Policy I. (SS) Selected topics. One course. *Staff*

265S. The Process of International Negotiation. (SS) Negotiations between governments or between international institutions and governments. Explorations of his-

toric cases, such as the U.S.-Canada Free Trade Negotiation, the INF Talks, and Camp David Summit. C-L: Canadian Studies and Political Science 265S. One course. *Mayer*

266S. Comparative Social Policy. (SS) An examination of social and health policies in advanced industrial countries. Focus on understanding the comparative methods and role of the state, market, and voluntary sector in policy development and implementation. C-L: Comparative Area Studies and Political Science 266S. One course. *Smith*

267S. Policy-Making in International Organizations. (SS) Emphasis on international financial institutions such as the World Bank and the International Monetary Fund. C-L: Political Science 267S. One course. *Ascher*

271S. Schools and Social Policy. (SS) Public schools as instruments of public policy. Economic and statistical analysis of the educational production process. Consideration of alternative school reforms. One course. *Clotfelter*

272L. Resource and Environmental Economics. (SS) Includes laboratory. Prerequisite: introductory course in microeconomics. See C-L: Environment 270L; also C-L: Economics 270L. One course. *Kramer*

274. Resource and Environmental Policy. (SS) Development of a policy analysis framework for studying resource and environmental policy. Political institutions, interest group theory, public choice theory, role of economics in policy analysis, ethics and values. Application to current and historical U.S. policy issues. Prerequisite: Environment 270L, Public Policy Studies 272, or consent of instructor. C-L: Environment 274. One course. *Staff*

275S. Seminar in Urban Politics and Urban Public Policy. (SS) See C-L: Political Science 274S. One course. *Orr*

284S. Public Policy Process in Developing Countries. (SS) Policy-making patterns in less developed countries; examples from Latin America, Africa, and Asia. C-L: Comparative Area Studies and Political Science 284S. One course. *Ascher*

285. Land Use Principles and Policy. (SS) Consideration of four major roles of land in the United States: as a producer of commodities, financial asset, component of environmental systems, and location of development. Analysis of market allocation of land, market failure, role of public planning and regulation. C-L: Environment 285. One course. *Healy*

286S. Economic Policy-Making in Developing Countries. (SS) Fiscal, monetary, and exchange rate policies in less developed countries; issues in public policy toward natural resources and state-owned enterprises. Prerequisite: Economics 149 or Public Policy Studies 110. C-L: Comparative Area Studies and Economics 286S. One course. *Conrad or Ramachandran*

288S. Current Issues in United States Federal Tax Policy. (SS) Prerequisite: Economics 149 or consent of instructor. See C-L: Economics 288S. One course. *Gentry*

290. Glasgow Seminar in Public Policy. (SS) Analysis of the British political system and important public policy problems in Britain including: privatization, Britain and the European community, and economic and social policy. (Taught in Scotland.) Prerequisites: Public Policy Studies 55D, three of the core courses (PPS 110, 112, 114 or 116) and consent of director of undergraduate studies. One course. *Staff*

Skills Courses

81. Essentials of Public Speaking. Basics of and practice in oral presentations, with particular attention to the gathering and organization of speech materials. Preference

given to freshmen and sophomores. Does not apply toward public policy studies major. Consent of instructor required. One course. *Hill or O'dor*

82. Essentials of Public Speaking. Similar to Public Policy Studies 81, but for juniors and seniors. Not open to students who have taken Drama 81 or 82, or Public Policy Studies 81. Does not apply toward public policy studies major. One course. *Hill or O'dor*

83S. Argumentation. Analysis, investigation, evidence, reasoning and refutation, and other communication strategies. Consent of instructor required. Does not apply toward public policy studies major. One course. *O'dor*

COURSES CURRENTLY UNSCHEDULED

112. Statistics and Public Policy. (QR)

118S. Ethical Dilemmas and Social Policy. (SS)

166. Child Policy in the United States. (SS)

178S. Visual Language and Policy Choice. (SS)

185. American Diplomacy from the Kennedy Administration to the Present. (SS)

186S. Shaping the News. (SS)

204S. Ethics in Political Life. (SS)

221. Decision Analysis for Public Policymakers. (SS)

237. Public Management II: Managing Public Agencies. (SS)

240S. Analyzing the News. (SS)

245S. Leadership Tutorial. (SS)

250S. Policy, Philanthropy, and the Arts. (SS)

252S. United States Strategic Arms Policy. (SS)

254. Transportation Planning and Policy Analysis. (SS)

269. The Regulatory Process. (SS)

270S. Humanistic Perspectives on Public Policy. (SS)

278. Human Service Bureaucracies. (SS)

283S. Congressional Policy-Making. (SS)

INTERNSHIP COURSES

The internship courses provide students with an opportunity to develop a basic understanding of one or more public policy areas, to apply that understanding in a job during the summer, and to return to the classroom to build on this knowledge and experience. Normally, students take a pre-internship course during the spring semester of their junior year as one of several substantive courses including arts policy, international policy, telecommunications policy, health policy, administration of justice, state and local policy, environmental policy, and free press and public policy. Students then follow up their pre-internship course with a summer internship.

In order to participate in the summer internship, all majors must have completed Public Policy Studies 55D and three of the four core courses (Public Policy Studies 110, 112, 114, or 116). This requirement may be waived by the director of undergraduate studies for transfer students or others in unusual circumstances. Applications for

enrollment in the internship program must be completed in the early fall and approved by the assistant director of internships, placement, and alumni.

Stipends are usually provided for all public policy studies majors enrolled in a pre-internship course and any one of the following summer courses: Public Policy Studies 148S, 152S, 155S, 156S, 158S, 161S, 164S, or 168S. All majors are encouraged to take an advanced follow-up course in the area of their summer internship.

THE MAJOR

The public policy studies major is an interdisciplinary social science program designed to provide students with the skills, analytical perspectives, and descriptive information needed to deal effectively with major contemporary social problems. The course of study familiarizes the student with the kind of contribution each of several disciplines (political science, economics, social psychology, applied mathematics, history, and ethics) can make to one's understanding of contemporary policy issues such as air pollution, crime, and international trade disputes. Opportunities are provided, both in the classroom and through field experiences, for students to integrate this material and apply it to the analysis of specific public policy issues.

Students majoring in public policy participate in a variety of learning experiences including seminars, lecture and discussion classes, individual study, policy workshops, and an internship. In addition, students are urged to participate actively in programs sponsored by the Sanford Institute of Public Policy to supplement material covered in class. As a matter of policy, students are asked to evaluate teaching and course content and are provided both formal and informal opportunities to shape the program and curriculum.

Prerequisites. Economics 2D or 52D; Political Science 90A, 91, 101 or equivalent; and Public Policy Studies 55D.

Major Requirements. Public Policy Studies 110, 112, 114, 116, plus three 100/200-level elective courses; one of these must be a 200-level course. Statistics 10D or Statistics 110A or Statistics 110B or Political Science 138 is an acceptable substitute for Public Policy Studies 112. Economics 149 is an acceptable substitute for Public Policy Studies 110. Political Science 90A, 91, 101 or equivalent is a prerequisite for Public Policy Studies 114. The requirement may be waived by the director of undergraduate studies for students with an adequate academic background in American politics. A satisfactory policy-oriented field experience approved by the assistant director of internships, placement, and alumni is required. (See Internship Courses above.)

Religion (REL)

Professor Hillerbrand, *Chair*; Professor Wintermute, *Director of Undergraduate Studies*; Professors Clark, Kort, Lawrence, C. Meyers, E. Meyers, Osborn, Sanders, and Surin (literature); Associate Professors Bland, Corless, McCollough, and Peters; Assistant Professors Cornell, Hart, Joyce, and Martin; Lecturer Shows

A major is available in this department.

Study in the Department of Religion arises from the recognition that religion, although it takes many forms, is a constitutive element of human existence individually and collectively. The curriculum is organized so that courses at the 40 level provide an introduction to the major religious traditions, those with significant representation and influence throughout the world. Courses at the 50 level give special attention to the authoritative texts of a major religion, in the context of its historical tradition, geographical location, and cultural ethos. Courses at the 60 level study a topic in religion from various disciplinary perspectives, with concern for their differences and impacts.

Introductory courses (Religion 40, 41, 42, 43, 44, 45, 46, 50, 52, 53, 54, 55, 56, 59, 61, 62, and 63) are open to all undergraduates. These courses also help fulfill distributional field requirements for the religion major. Courses at the 100 level, with the exception of

those specially designated, are open to all undergraduates. Courses at the 200 level are open to upperclassmen with the consent of the instructor.

20S. Special Topics in Writing. One course. *Staff*

40. Judaism. (CZ) Introduction to Judaic civilization from its origins to modern times. Not open to students who have taken Religion 51. C-L: Judaic Studies and Women's Studies. One course. *Staff*

41. Christianity. (CZ) Introduction to Christianity in history and modern times. One course. *Hillerbrand and staff*

42. Islam. (CZ) Introduction to Islam in history and modern times. One course. *Cornell or Lawrence*

43. Hinduism. (CZ) Introduction to Hinduism in history and modern times. One course. *Staff*

44. Buddhism. (CZ) Introduction to Buddhism in history and modern times. Not open to students who have taken Religion 149. One course. *Staff*

45. Religions of Asia. (CZ) Problems and methods in the study of religion, followed by a survey of the historical development, beliefs, practices, and contemporary significance of the Islamic religion and religions of south and east Asia. Not open to students who have taken Religion 57. C-L: Comparative Area Studies. One course. *Cornell or Lawrence*

46. Religions of China and Japan. (CZ) Traditional religion in China and Japan and its interaction with Sino-Japanese Buddhism. Not open to students who have taken Religion 141. C-L: Comparative Area Studies. One course. *Corless*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50. The Old Testament/Hebrew Bible. (CZ) Historical, literary, and theological investigations. C-L: Judaic Studies. One course. *C. Meyers, E. Meyers, Peters, or Wintermute*

52. The New Testament. (CZ) Origins, development, and content of thought. One course. *Martin, Sanders, or staff*

53. The Roman Catholic Tradition. (CZ) A survey of the development of Roman Catholic theology and institutions from the second century to Vatican II. One course. *Clark*

56. Religion in the West. (CZ) Judaism, Christianity, and Islam in their historical and cultural contexts, with their precursors and successors. Not open to students who have taken Religion 61 (Introduction to Religions of the West). One course. *Corless*

58. Muhammad and the Qur'an. (CZ) The Qur'an in relation to the religious experience, life, and work of Muhammad. Not open to students who have taken Religion 147. C-L: Comparative Area Studies. One course. *Cornell*

59. An Introduction to Christian Theology and Ethics. (CZ) Analysis and interpretation of faith and practice. One course. *Kort, McCollough, or Osborn*

61. Religion and Psychology. (SS) Contributions of major psychological theories to an understanding of religion, especially Christianity. Not open to students who have taken Religion 158. One course. *Shous*

62. Religion and Film. (CZ) A study of the relationship of motion pictures and religion. The inquiry will focus on the portrayal of organized religion; expressions of

religious life; and religious topics, such as God, evil and morality, in motion pictures. One course. *Hillerbrand*

63. Religion and Society. (CZ) Introduction to the interface between religion and its social contexts. Issues such as social organizations, politics, systems of value, and the arts from a global and comparative perspective. One course. *Staff*

71A, 72A. Seminar for First- and Second-Year Students: Global Religions. (CZ) Topics and instructors to be announced. One course each. *Staff*

71B, 72B. Seminar for First- and Second-Year Students: Traditions, Texts, and Contexts. (CZ) Topics and instructors to be announced. One course each. *Staff*

71C, 72C. Seminar for First- and Second-Year Students: Theoretical Perspectives. (CZ) Topics and instructors to be announced. One course each. *Staff*

99. Perspectives in Archaeology. (CZ) Major trends and issues in archaeology, literature and material culture, history and process, and applications of archaeology to modern society. Focus on the material remains of the past and traditional and modern methods of their analysis. May be offered abroad in Duke's Summer Program in Israel or Greece. C-L: Classical Studies 99, Interdisciplinary Course 99, and Judaic Studies. One course. *C. Meyers, E. Meyers, Younger, and staff*

101. Selected Studies in the Bible: Prophets. (CZ) Analysis and interpretation of representative issues and personalities in the historical and prophetic books. C-L: Judaic Studies. One course. *Staff*

102. Selected Studies in the Bible: Writings. (CZ) Analysis and interpretation of representative forms and ideas, with particular attention to wisdom literature and psalms. C-L: Judaic Studies. One course. *Staff*

103. Islam on the Pacific Rim. (CZ) The development of Islam and Islamic civilization in Southeast and Eastern Asia from the rise of Islam to modern times. One course. *Cornell*

104. Apocalypse Then and Now: Ancient and Modern Apocalypticism. (CZ) An interdisciplinary examination of ancient Jewish and Christian apocalypticism combined with study of occurrences of apocalyptic images and themes in modern fiction, politics, art, film, and social movements. The various functions of apocalyptic in ancient and modern cultures and conflicts. One course. *Martin*

105. Theology of the Old Testament. (CZ) Emphasis upon history and eschatology, covenant, messianism, and wisdom. C-L: Judaic Studies. One course. *Wintermute*

106. Jesus and the Synoptic Gospels. (CZ) The gospel tradition in the New Testament. One course. *Staff*

107. Theology of the New Testament. (AL) A systematic analysis of the theologies of the New Testament writers and an attempt to synthesize the basic and shared themes. One course. *Staff*

108. The Life and Letters of Paul. (CZ) Paul's role in the expansion of the Christian movement, the most important aspects of his thought, and his continuing influence. One course. *Martin or Sanders*

109. Women in the Biblical Tradition: Image and Role. (CZ) C-L: Judaic Studies and Women's Studies. One course. *C. Meyers*

110. Archaeology and Art of the Biblical World. (CZ) The material culture of ancient Palestine as it relates to the Hebrew Bible, the New Testament, and early Judaism. C-L: Comparative Area Studies and Judaic Studies. One course. *C. Meyers or E. Meyers*

- 111. The Historical Jesus. (CZ)** Historical research on the life of Jesus. One course. *Martin or Sanders*
- 112. Muslim Minorities in Society: From Asia to America. (CZ)** The historical formation, legal status, and political options of Muslim minorities in non-Muslim nation-states. Special attention to China, the Philippines, India, Europe, and North America. Intra-Muslim and international perspectives, looking at the networks of exchange and communication since the end of colonialism. C-L: Comparative Area Studies. One course. *Cornell and Lawrence*
- 113. Liberation Theologies in Asia, Africa, and Latin America. (CZ)** The various "Third World" liberation theologies which have emerged in Christian churches since the mid-1960s; special attention to those being developed by women in Latin America, Africa, and Asia which challenge the liberation theologies developed by their male counterparts. C-L: Comparative Area Studies. One course. *Staff*
- 114S. Ethical Issues in Twentieth-Century America. (CZ)** A critical examination of ethical themes, with special emphasis on public policy. For participants in the Twentieth-Century America FOCUS Program only. Not open to students who have taken Religion 60. One course. *McCollough*
- 115-116. Introduction to Biblical Hebrew. (FL)** (Divinity School courses open to undergraduates with consent of instructor.) Elements of phonology, morphology, and syntax. Exercises in reading and writing Hebrew. 116: study of the weak verb; exegetical treatment of the Book of Jonah. C-L: Judaic Studies. Two courses. *Staff*
- 117. Mahayana Buddhism. (CZ)** Special features of the doctrine and practice of Buddhism in Tibet, China, Korea, and Japan, with an account of their origins in the Indian subcontinent. One course. *Corless*
- 120. History of the Christian Church. (CZ)** Crucial events, issues, structures, and writings that have shaped the Christian community and influenced Western civilization from the time of the early church to the present. C-L: History 156B. One course. *Hillerbrand*
- 121. Comparative Approaches to Global Issues. (SS)** See C-L: Comparative Area Studies 125; also C-L: Cultural Anthropology 125, History 137, Political Science 125, and Sociology 125. One course. *Staff*
- 122. The Age of the Reformation. (CZ)** Religious change and political consolidation in Europe: 1500-1650. One course. *Hillerbrand*
- 124. History of Religion in America. (CZ)** A historical survey, with emphasis on the ways that religious experiences, beliefs, and traditions have found expression in religious communities and institutions, and in American public life. One course. *Staff*
- 125. Women and Sexuality in the Christian Tradition. (CZ)** A historical survey of Christian attitudes and practices from New Testament times to the present. C-L: Comparative Area Studies and Women's Studies. One course. *Clark*
- 126. Russian Orthodoxy. (CZ)** See C-L: Russian 129. One course. *Pelech*
- 128. Christians in Crisis. (CZ)** Christian thought and debate on, and theological analysis of, such contemporary issues as abortion, creationism, homosexuality, liberation, poverty, racism, and sexism. One course. *Osborn*
- 129. Contemporary Christian Faith and Politics. (CZ)** One course. *Osborn*
- 130. Late Antique Christian Art. (AL)** See C-L: Art 130; also C-L: Classical Studies 130. One course. *Wharton*

133. The Foundations of Post-Biblical Judaism. (CZ) History, religion, and literature of Pharisaic and sectarian Judaism from the time of Ezra to Rabbi Judah. C-L: Judaic Studies. One course. *E. Meyers*

134. Jewish Mysticism. (CZ) The main historical stages, personalities, texts, and doctrines from rabbinic to modern times. C-L: Comparative Area Studies, Judaic Studies, and Medieval and Renaissance Studies. One course. *Bland*

136. Contemporary Jewish Thought. (CZ) Modern Jewish thought from Mendelssohn to the present, with particular reference to American thinkers. C-L: Comparative Area Studies and Judaic Studies. One course. *Bland or E. Meyers*

137. An Introduction to Judaism in the Greco-Roman World. (CZ) History, religion, and literature of the Jews in Palestine from 200 B.C.E. to 66 C.E. Not open to students who have taken Religion 277. One course. *Sanders*

139. Women in Islam. (CZ) See C-L: Asian and African Languages and Literature 190; also C-L: Comparative Area Studies and Women's Studies. One course. *Cooke*

140. Religions of India. (CZ) Major religious traditions of the subcontinent: Hinduism, Buddhism, Jainism, and Islam. C-L: Comparative Area Studies. One course. *Lawrence or staff*

148. Modern American Religious Cults. (CZ) New or alternative religious groups such as the Moonies, Hare Krishnas, Wicca, Satanism, Scientology, TM, Eckankar, UFO cults, and the New Age Movement. One course. *Partin*

151. Ethical Issues in Social Change and Public Policy. (CZ) American moral tradition and factors in social change in the normative analysis of public policy, with a consideration of specific ethical issues. One course. *McCollough*

152. Islamic Mysticism. (CZ) Sufism as an ascetical protest movement that affected the worldwide growth of Islam. C-L: Comparative Area Studies. One course. *Lawrence*

153. From the African Kraal to the African-American Church. (CZ) The religious transition and adaptation of the West African diaspora in America. C-L: African and Afro-American Studies 153. One course. *Lincoln*

154. African-American Religion, History, and Culture. (CZ) The varied expressions of African-American spirituality as the black church matures as the preeminent definition of African-American culture. C-L: African and Afro-American Studies 152. One course. *Hart*

155. Ethical Issues in the Life Cycle. (CZ) Human development viewed in religious, ethical, and psychological perspectives. One course. *McCollough*

159. Ethical Issues in Health Care. (CZ) A theological and comparative study of selected ethical issues in health policy: the profession of medicine, institutional organization and services, and medical practice. One course. *McCollough*

160, 161. Introduction to the Civilizations of Southern Asia. (CZ) See C-L: Interdisciplinary Course 101, 102; also C-L: Asian and African Languages and Literature 160, 161; Comparative Area Studies; Cultural Anthropology 101, 102; and History 193, 194. One course each. *Khanna or staff*

162, 163. Introduction to Islamic Civilization. (CZ) See C-L: Interdisciplinary Course 162, 163; also C-L: Comparative Area Studies; Cultural Anthropology 147, 148; History 101G, 102G; and Medieval and Renaissance Studies. One course each. *Cornell, Lawrence, and staff*

164. History and Religions of North Africa. (CZ) An introduction to the cultural patterns, social forces, and historical developments that have shaped North Africa and its major religious traditions. C-L: African and Afro-American Studies 164, Comparative Area Studies, History 187, and Interdisciplinary Course 164. One course. *Cornell*

167. The Reformation of the Sixteenth Century. (CZ) A survey of the changes in sixteenth-century European society, with particular reference to the continent, which grew out of the movement for religious reform and renewal. Focus on new developments in theology and religion and their relationship to society. C-L: History 156A. One course. *Hillerbrand*

170. Problems of Religious Thought. (CZ) Analysis of uses of *know, true, mind, body, time, person, love, meaning*, in modern Western culture as introduction to religious reflection. One course. *Staff*

174. Technology Assessment and Social Choice. (CZ) See C-L: Engineering 174. One course. *Garg and McCollough*

186. Faith and Fiction in Victorian England. (AL) The relation of fiction to major religious and theological developments in England during the Victorian period. (Summer program in England.) Not open to students who have taken English 137. C-L: English 132A. One course. *Kort*

187. Atmosphere and Mystery in Twentieth-Century English Fiction. (AL) Narrative atmosphere in English fiction of this century in relation to beliefs about circumstances that limit and determine the human world. Not open to students who have taken English 138. C-L: English 132B. One course. *Kort*

188. Religion in Recent American Fiction. (AL) Religious elements in recent literature. One course. *Kort*

189. Autobiography and Religious Identity. (CZ) A study of contemporary autobiographies by Jewish, Catholic, and Protestant writers, of theories concerning autobiography and religious identity, and of autobiography as a kind of writing. One course. *Kort*

190S. The Family in Christian History. (CZ) Open to sophomores, juniors, and seniors. Consent of instructor required. See C-L: Distinguished Professor Course 197S; also C-L: Women's Studies. One course. *Clark*

191, 192. Independent Study. For freshmen and sophomores with departmental approval. One course each. *Staff*

193, 194. Independent Study. For juniors and seniors with departmental approval. One course each. *Staff*

195A, 196A. Junior-Senior Seminars: Global Religions. (CZ) Topics and instructors to be announced. One course each. *Staff*

195B, 196B. Junior-Senior Seminars: Traditions, Texts, and Contexts. (CZ) Topics and instructors to be announced. C-L: Judaic Studies. One course each. *Staff*

195C, 196C. Junior-Senior Seminars: Theoretical Perspectives. (CZ) Topics and instructors to be announced. One course each. *Staff*

197-198. Honors Research. Consent of the director of undergraduate studies required. Two courses. *Staff*

For Seniors and Graduates

201. Studies in Intertestamental Literature. (CZ) Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to postexilic Judaism. Consent of instructor required. One course. *Wintermute*

202. Language and Literature of Dead Sea Scrolls. (CZ) A study in interpretation. Prerequisite: a knowledge of Hebrew. One course. *Wintermute*

207, 208. Readings from the Hebrew Bible. (FL) Grammar with rapid reading of selected passages, both prose and poetry. Prerequisite: at least one year of Hebrew or consent of instructor. C-L: Judaic Studies and Old Testament 207, 208. One course each. *Staff*

212. Theories of Religion. (CZ) Late nineteenth- and twentieth-century theories, interpretations, and approaches to the study of religion. One course. *Hart*

216. Syriac. (CZ) The script and grammar, with readings from the Syriac New Testament and other early Christian documents. Prerequisites: some knowledge of Hebrew and Aramaic. One course. *Wintermute*

217. Islam in India. (CZ) History and thought of major Indian Muslims from Biruni to Wali-Ullah, with special attention to the role of Sufism. An introduction to selected Muslim scholars and saints who contributed to the interaction between Islam and Hinduism in northern India during the second millennium A.D. C-L: Comparative Area Studies. One course. *Lawrence*

218. Religions of East Asia. (CZ) Shinto, Taoism, Confucianism, and East Asian Buddhism studied phenomenologically in relation to the Axial Age. C-L: Comparative Area Studies. One course. *Corless*

220. Rabbinic Hebrew. (FL) Interpretive study of late Hebrew, with readings from the Mishnah and Jewish liturgy. C-L: Judaic Studies. One course. *E. Meyers or staff*

221. Readings in Hebrew Biblical Commentaries. (CZ) Selected Hebrew texts in Midrash Aggadah and other Hebrew commentaries reflecting major trends of classical Jewish exegesis. C-L: Judaic Studies. One course. *Bland*

224A. Comparative Semitic I. (FL) An introduction to the morphology and syntax of classical Ethiopic and the Semitic languages of Mesopotamia, together with a consideration of their relationships to Hebrew. One course. *Wintermute*

224B. Comparative Semitic II. (FL) An introduction to the morphology and syntax of classical Arabic and the Semitic languages of Palestine-Syria, together with a consideration of their relationships to Hebrew. One course. *Wintermute*

226F. Exegesis of the Greek New Testament (I and II Corinthians). (CZ) Consent of instructor required. One course. *Staff*

228. Twentieth-Century Continental Theology. (CZ) An investigation of leading theologians and theological trends. One course. *Osborn*

229S. Old Church Slavonic. (FL) See C-L: Russian 203S; also C-L: Linguistics. One course. *Pugh*

230. Sainthood in Comparative Perspective. (CZ) Examination of sainthood, saint cults, and sacred biography from a multidisciplinary and global perspective. One course. *Cornell*

231S. Seminar in Religion and Contemporary Thought. (CZ) Analytical reading and discussion of such critical cultural analysis as is found in the works of Polanyi, Arendt, Trilling, and others, with appraisal of the relevance of theological inquiry. One course. *Staff*

- 232S. Religion and Literary Studies. (AL)** Theories concerning the relation of religion to literary forms, particularly narrative. One course. *Kort*
- 233. Modern Narratives and Religious Meanings. (AL)** A study of kinds of religious meaning or significance in representative American, British, and continental fiction of the first half of the twentieth century. One course. *Kort*
- 234. Early Christian Asceticism. (CZ)** The development of asceticism and monasticism in the first six centuries of Christianity. C-L: Women's Studies. One course. *Clark*
- 235. Heresy: Theological and Social Dimensions of Early Christian Dissent. (CZ)** One course. *Clark*
- 239. Introduction to Middle Egyptian I. (FL)** Grammar and readings in hieroglyphic texts relating to the Old Testament. One course. *Wintermute*
- 248. Theology of Karl Barth. (CZ)** A historical and critical study of Barth's theology. One course. *Osborn*
- 253. Feminist Theory and the Study of Christianity. (CZ)** Nineteenth- and twentieth-century feminist theories and their implications for Christian doctrine and biblical interpretation. C-L: Women's Studies. One course. *Clark and McClintock-Fulkerson*
- 254. Justice, Law, and Commerce in Islam. (CZ)** Islamic approaches to the legal and ethical regulation of social life. One course. *Cornell*
- 258. Coptic. (FL)** Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: one year of Greek or consent of instructor. One course. *Wintermute*
- 274A. Philosophies, Sciences, and Theologies of the European Enlightenment: Descartes to Kant. (CZ)** Western theological thought since the Scientific Revolution, with emphasis on developments and movements that occurred in the seventeenth and eighteenth centuries. Descartes, Locke, Leibniz, Spinoza, Hume, Vico, Lessing, Herder, and Kant. One course. *Surin*
- 275S. Topics in Early Christian and Byzantine Art. (AL)** Consent of instructor required. See C-L: Art 233S; also C-L: Classical Studies 230S and Medieval and Renaissance Studies. One course. *Wharton*
- 277. Judaism in the Greco-Roman World. (CZ)** History, religion, and literature of the Jews in Palestine from 200 B.C.E. to 66 C.E. Not open to students who have taken Religion 137. Prerequisite: one year of Greek. One course. *Sanders*
- 284. The Religion and History of Islam. (CZ)** Origins and development of the Islamic community and tradition, with particular attention to the religious element. C-L: Comparative Area Studies. One course. *Cornell or Lawrence*
- COURSES CURRENTLY UNSCHEDULED**
- 52D. The New Testament. (CZ)**
- 54. Protestant Traditions. (CZ)**
- 55. Biblical Literature. (AL)**
- 100. Selected Studies in the Bible: Pentateuch. (CZ)**
- 123. Issues in Early Christian History. (CZ)**
- 131D. Principles of Archaeological Investigation. (CZ)**
- 132D. Palestine in Late Antiquity. (CZ)**
- 135. Jewish Religious Thought. (CZ)**

- 143. Mysticism. (CZ)
- 157. Bioethics in Comparative Contexts. (CZ)
- 226B. Exegesis of the Greek New Testament (Romans). (CZ)
- 240. Introduction to Middle Egyptian II. (FL)
- 243. Archaeology of Palestine in Biblical Times. (CZ)
- 244. Archaeology of Palestine in Hellenistic-Roman Times. (CZ)
- 261. Islam in the African-American Experience. (CZ)
- 264. The Sociology of the Black Church. (SS)
- 274B. Philosophies, Sciences, and Theologies after the European Enlightenment: Schleiermacher to Troeltsch. (CZ)
- 280. The History of the History of Religions. (CZ)
- 283. Islam and Modernism. (CZ)
- 288. Buddhist Thought and Practice. (CZ)
- 297. Philosophical and Theological Discourses on Modernity. (CZ)
- 298. Religious Pluralism and Christian Theologies. (CZ)

RELIGION COURSES BY AREA

For students matriculating in the fall 1994 semester and thereafter:

A. Global Religions. (Division I—40, 41, 42, Division II—43, 44, 45, 46), 71A, 72A, 117, 134, 143, 149, 152, 160, 161, 162, 163, 195A, 196A, 284, 288.

B. Traditions, Texts, and Contexts. 50, 52, 53, 54, 55, 56, 58, 59, 71B, 72B, 100, 101, 102, 103, 105, 106, 107, 108, 109, 111, 112, 113, 115, 116, 122, 123, 124, 125, 128, 129, 130, 132D, 133, 135, 136, 137, 140, 148, 153, 154, 164, 167, 168, 195B, 196B, 201, 202, 207, 208, 216, 217, 218, 220, 221, 224A, 224B, 226B, 226F, 228, 229S, 234, 235, 239, 240, 243, 244, 248, 254, 258, 261, 275, 277, 283.

C. Theoretical Perspectives. 61, 62, 63, 71C, 72C, 99, 104, 110, 114S, 121, 131D, 151, 155, 157, 159, 170, 186, 187, 188, 189, 195C, 196C, 212, 231S, 232S, 233, 253, 264, 274A, 280, 297, 298.

Students who matriculated prior to fall 1994 should also consult the 1993-94 Bulletin for the list of courses in the three fields applicable to their major. (See The Major below.)

THE MAJOR

For students matriculating in the fall 1994 semester and thereafter:

Major Requirements. Eight courses, which must include at least two courses from Global Religions, one from Division I and one from Division II of the 40-level courses. There must be a minimum of one 100-level course in traditions, texts, and contexts and one in theoretical perspectives. One of the eight courses must be a junior-senior seminar, independent study or a 200-level course. The student, in consultation with an assigned advisor and with the advisor's approval, will choose a concentration of four related courses. The four courses constitute a thematic or methodological concentration on a particular aspect of religion.

For students who matriculated before the fall 1994 semester:

Students may satisfy the requirements listed above for those matriculating in the fall 1994 semester and thereafter, or they may satisfy the requirements as published in the bulletin for the year that they matriculated.

To prepare for graduate or professional study of religion, the department recommends that students complete at least four courses in college level study, or the equivalent, of a foreign language. Master of Arts and Doctor of Philosophy programs often require examination in one or two foreign languages. Students planning to attend a theological seminary should note that knowledge of biblical languages, as well as Latin, frequently is presupposed or required. Those planning to pursue studies of Asian religions should begin appropriate language study as part of their undergraduate preparation.

Honors/Distinction. The department offers work leading to graduation with distinction. For further information consult the director of undergraduate studies and the section on honors in this bulletin.

Romance Studies (RS)

Professor Mignolo, *Chair*; Associate Professor Longino, *Director of Undergraduate Studies*; Professors Bell, Caserta, Garci-Gómez, Jameson, Kaplan, Moi, Mudimbe, Orr, Osuna, Pérez Firmat, Schor, Stewart, Tetel, and Thomas; Associate Professors Finucci, Mudimbe-Boyi, Sieburth, and Solterer; Assistant Professors Moreiras and Vilarós; Associate Professor of the Practice and Director of Language Programs Tufts; Research Associate Professor Keineg; Adjunct Associate Professor Byrd; Visiting Research Professor Dorfman

Majors in French Studies, Italian Studies, and Spanish are available in this department.

French, Italian, and Spanish 22, 76, or an Achievement or Placement Test score of 600 in French, 600 in Italian, and 630 in Spanish, are prerequisites for all courses at or above the 100 level not taught in English. Students who by reason of foreign residence have had special opportunities in French, Italian, or Spanish must be classified by the director of undergraduate studies. The intensive language courses 21 and 22 provide an introduction to the language. They are recommended for students who wish to acquire proficiency in a second foreign language before entering graduate school. In literature, one credit is granted for a score of 4 and two credits for a score of 5 (French or Spanish 70, 71) on the examination of the advanced placement program. In language, one advanced placement credit (French or Spanish 76) is granted for scores of 4 and 5.

FRENCH (FR)

1-2. Elementary French. (FL) Understanding, speaking, reading, and writing French. Language laboratory for recording-listening practice. Two courses. *Staff*

12. Review of Elementary French. (FL) Intensive review of first-year French. Open only to students with a placement or achievement score of 380-440. May not be taken for credit by students who have taken 1-2. One course. *Staff*

14. Intensive Study of French. (FL) Covers the entire program of elementary French study in one semester using a media-based approach. Primary focus on oral skill development, with additional work on reading and writing. Two courses. *Staff*

14A. Intensive Study of French. (FL) Understanding, speaking, reading, and writing French. Offered only in the Duke in Québec Summer Program. Placement of returning students intending to continue in French studies determined by interview. Two courses. *Staff*

15. Intensive French. (FL) Covers the entire program of intermediate language study in one semester using a media-based approach. Continued emphasis on oral skill development and the introduction of progressively longer and more challenging reading and writing activities. Prerequisite: French 14 or the equivalent. Two courses. *Staff*

21. Accelerated Elementary French. (FL) Basic grammar structures in one semester; emphasis on oral work. Prerequisite: four semesters or the equivalent of another foreign language or consent of instructor. One course. *Staff*

22. Accelerated Intermediate French. (FL) Review of basic grammar; emphasis on reading, with some practice in writing. Prepares students to enroll in courses at the 100 level. Prerequisite: French 21 or consent of instructor. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

63. Intermediate French. (FL) Grammar review, reading, and oral practice, including laboratory experience. Prerequisite: French 2, 12, or achievement or placement test score of 450-540. One course. *Staff*

70, 71. Introduction to Literature. One or two course credits for advanced placement in literature. One course each.

76. Advanced Intermediate French. (FL) Oral practice, reading, composition. Prerequisite: French 63 or achievement or placement test score of 550-590. One course. *Staff*

100. Cultural and Literary Perspectives. (FL) Designed to give students leaving intermediate French the reading and writing skills necessary to enter 100-level courses in French studies. A close reading of cultural and literary texts which focus on themes such as daily life, philosophy, art, etc. One course. *Staff*

101, 102. Introduction to French Literature. (AL, FL) An introduction to the major writers of the French literary tradition. Selections and complete works of poetry, fiction, theater, and essay. 101: Middle Ages through the eighteenth century. 102: nineteenth and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in French. One course each. *Staff*

103S, 104S. Discussions of Readings. (AL, FL) Selected topics. Open only to freshmen and sophomores. One course each. *Staff*

105. Topics in French Thought and Culture from the Middle Ages to 1900. (CZ, FL) Topics such as class and social relationships; the nation and centralization; authority and the state; the rise of public education; language and centralization; history of ideas and mentalities; film and media. Readings in French from documents. One course. *Staff*

106. Topics in Modern French Thought and Culture: 1900 to the Present. (CZ, FL) Topics such as racism, colonialism and its aftermath; postwar ideology; women's movement; communication development; elitist technology; labor and leisure; community and privacy; environmental issues. One course. *Staff*

107S. Contemporary Ideas. (CZ, FL) Readings and discussion of French works which have provoked political or intellectual thought in recent years. For freshmen and sophomores only. C-L: Comparative Area Studies. One course. *Staff*

110. Advanced Grammar and Composition. (FL) A systematic study of the structure of formal French. Practice in writing. One course. *Thomas or staff*

111S. French for Current Affairs. (FL) Problems and controversies in today's France. Readings, discussions, and exposés. One course. *Keineg or staff*

113S. French for Business. (FL) Current issues in French business and commerce. C-L: Comparative Area Studies. One course. *Staff*

117. French Phonetics. (FL) Sounds, rhythm, intonation. Individual practice in language laboratory. Readings in phonetic theory. One course. *Thomas*

118. Advanced Translation and Stylistics. (FL) Differences between French and English patterns of expression. Levels of usage. Practice in translation. Prerequisite: French 110 or equivalent or consent of instructor. One course. *Thomas or staff*

131S. French in the New World. (FL, SS) French and Creole in Canada, New England, Louisiana, and the Caribbean. Origins, history, linguistic characteristics, current political and social issues. C-L: Canadian Studies, Comparative Area Studies, and Linguistics. One course. *Thomas*

137. Aspects of Contemporary French Culture. (CZ, FL) Offered only as part of summer program in Paris. C-L: Comparative Area Studies. One course. *Staff*

139. French Civilization. (CZ, FL) The institutions and culture of France from the Middle Ages to the present. Readings and discussions in French. C-L: Comparative Area Studies. One course. *Kaineg or Tetel*

141S, 142S. French Literature. (AL, FL) Topics to be announced. Open to juniors and seniors. One course each. *Staff*

143. Aspects of French Literature. (AL, FL) Concentration on single authors, genres, movements, or themes. Topics to be announced. Offered only as part of summer program in Paris. One course. *Staff*

145S. Topics in Renaissance Literature and Culture. (AL, FL) Topics may include: women writers, love and self-knowledge, carnival and the grotesque, in search of Rome, text as political and religious pamphlet. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Tetel*

146S. Montaigne and Self-Portraiture. (AL, FL) A reading of some *essais* in the light of the self-portrait in Renaissance art. C-L: Medieval and Renaissance Studies. One course. *Tetel*

147. Seventeenth-Century Fictions of Women. (AL, FL) Works by and about women in the early modern period taking into account the *querelle des femmes*, the *préciosité* movement, and women's contribution to the development of the novel and the epistolary genre. C-L: Women's Studies. One course. *Longino*

148. French Drama of the Seventeenth Century. (AL, FL) The political content of plays by Corneille, Molière and Racine, with relation to court culture, social movements, and to relations between the Court of Louis XIV and the Porte of the Ottoman Empire. C-L: Drama 126 and Medieval and Renaissance Studies. One course. *Longino*

152. The Early French Novel. (AL, FL) Origins and evolution of the novel in the seventeenth and eighteenth centuries: Madame de Lafayette, Marivaux, Prévost, Rousseau, Diderot, Laclos, Sade. One course. *Stewart*

153. The French Enlightenment. (AL, FL) Religion, politics, and philosophic and literary ideas of eighteenth-century France: Montesquieu, Voltaire, Rousseau, and others. C-L: Comparative Area Studies. One course. *Stewart*

156. The Age of the Novel. (AL, FL) Flaubert, Balzac, and Stendhal. One course. *Bell, Orr, or Schor*

159. Feminist Fiction. (AL, FL) Works by women in the modern period, including George Sand, Colette, Simone de Beauvoir, and others. C-L: Women's Studies. One course. *Orr*

162. French Drama of the Twentieth Century. (AL, FL) A survey of literature for the stage from 1890 to the present. One play each of Claudel, Maeterlinck, Jarry,

Giraudoux, Cocteau, Ghelderode, Anouilh, Montherlant, Sartre, Camus, Genet, Ionesco, Beckett, Pinget, Vian, and Arrabal. C-L: Drama 123. One course. *Tufts*

165. French Existentialism. (CZ, FL) A critical introduction to the chief positions and controversies of French existentialism. One course. *Mudimbe*

166, 167. Contemporary French Life and Thought. (AL, FL) Major writers of the twentieth century and their historical and cultural circumstances. 166: Proust, Gide and the *Nouvelle revue française*, Colette, Alain-Fournier, Mauriac and the generation of 1914; the social novel of the 1930s. 167: Existentialism and *Les Temps Modernes*, the New Novel, the writer-critics, recent trends. C-L: Comparative Area Studies and Women's Studies. One course each. *Kaplan*

168. Francophone Literature. (AL, FL) Modern literature in French from French-speaking Africa and the French Caribbean. Topics include tradition and modernity; colonization, cultural assimilation, and the search for identity; and women in changing contexts. Prerequisite: good knowledge of French. C-L: African and Afro-American Studies 138, Asian and African Languages and Literature 168, and Comparative Area Studies. One course. *Mudimbe-Boyi*

169. The Contemporary Novel in French Canada. (AL, FL) Major trends in the novel since World War II: social revolt, proletarianism, political and religious liberation, and rejection of the past. C-L: Canadian Studies and Comparative Area Studies. One course. *Keineg*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

195. Topics in French Literature and Culture. (AL, FL) Topics to be announced. Offered only in the Duke in France Program. One course. *Staff*

200S. Seminar in French Literature. (AL, FL) Topics to be announced. One course. *Staff*

210. The Structure of French. (FL) Modern French phonology, morphology, and syntax. Readings in current linguistic theory. C-L: Linguistics. One course. *Thomas*

211. History of the French Language. (FL) The evolution of French from Latin to its present form; internal developments and external influences. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Thomas*

223. Semiotics for Literature. (AL) Theoretical writings in general semiotics by Frege, Peirce, Saussure, Mukarovsky, and Morris and their applications for textual analysis of French literary works by representative contemporary critics such as Eco, Riffaterre, Corti, and Greimas. Taught in English. C-L: Literature 280. One course. *Thomas*

240. Old French Literature. (AL, FL) An introduction to medieval French literary texts. One course. *Solterer*

256. Modern Literature and History. (AL) The problems of history, society, and politics in literature, through the writings of Rousseau, Tocqueville, Michelet, Flaubert, Hugo, Merleau-Ponty, Foucault, and others. C-L: History 256. One course. *Orr*

258. The Narrative of Social Crisis. (AL, FL) Realism and naturalism, with special emphasis on Balzac, Flaubert, and Zola. One course. *Bell, Jameson, Orr, or Schor*

261. French Symbolism. (AL, FL) Poetry and theories of Baudelaire, Mallarmé, and Rimbaud. Decadence: Lautréamont and Laforgue. One course. *Thomas*

264. Contemporary French Poetry. (AL, FL) The language of poetry. A chronological and theoretical approach to the major poets and movements since 1950. Selections from Bonnefoy, Char, Daive, Deguy, Dupin, Jabès, Jaccottet, Faye, Guillevic, Michaux, Meschonnic, Noël, Oulipo, Ponge, Stefan, Tortel, and others. One course. *Orr or Thomas*

265. French Literature of the Early Twentieth Century. (AL, FL) Emphasis on Gide, Mauriac, Proust, and Colette. One course. *Kaplan*

266. French Literature of the Mid-Twentieth Century. (AL, FL) Emphasis on Malraux, Sartre, Camus, and the *nouveau roman*. One course. *Jameson*

281. Paradigms of Modern Thought. (AL) An introduction to contemporary French philosophy with a focus on the notions of identity and difference, the human origin of truth and the question of enunciation. French majors and French graduate students must do course work in French. One course. *Mudimbe*

Courses Currently Unscheduled

108S. French Women: Myths, Realities, and the Law. (CZ, FL)

112S. Special Topics in Advanced Language. (FL)

136S. Life in Eighteenth-Century France. (CZ, FL)

151. French Comedy. (AL, FL)

155. Romanticism in French Literature. (AL, FL)

157. Difference and Representation. (AL, FL)

158. Toward Modernism in French Poetry. (AL, FL)

163. French Poetry of the Twentieth Century. (AL, FL)

170. Film and the French Novel. (AL, FL)

257. Problems of Identity in the Nineteenth-Century Novel. (AL, FL)

263. Contemporary French Theater. (AL, FL)

290S. Studies in a Contemporary Figure. (AL, FL)

ITALIAN (IT)

1-2. Elementary Italian. (FL) Understanding, speaking, reading, and writing Italian. Language laboratory available for recording-listening practice. Two courses. *Staff*

11. Intensive Study of Italian. (FL) For beginners or intermediate students. Practice in understanding, speaking, reading, and writing; emphasis on spoken and written language patterns used in everyday life in Italy. Offered in the Duke in Bologna semester program. Placement test administered to returning students intending to continue Italian language studies. One course. *Staff*

21. Accelerated Elementary Italian. (FL) Basic grammar structures in one semester; emphasis on oral work. Prerequisite: four semesters or the equivalent of another foreign language or consent of instructor. One course. *Staff*

22. Accelerated Intermediate Italian. (FL) Readings in modern literature; analysis and discussion. Prepares students to enroll in courses at the 100 level. Prerequisite: Italian 21 or consent of instructor. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

63. Intermediate Italian. (FL) Grammar review, reading, oral practice including laboratory experience. One course. *Staff*

76. Advanced Intermediate Italian. (FL) Oral practice, reading, and composition. Prerequisite: Italian 63 or achievement or placement test score of 550-590. One course. *Staff*

101, 102. Introduction to Italian Literature. (AL, FL) Major writers of the Italian literary tradition. Selections and complete works of poetry, fiction, theater, and essay. 101: Middle Ages to the seventeenth century. 102: Eighteenth, nineteenth, and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in Italian. 101 cross-listed with Medieval and Renaissance Studies. One course each. *Caserta or Finucci*

105. Italian Women Writers. (AL, FL) Representative works by women from the Middle Ages to the modern period. Caterina da Siena, Colonna, Stampa, Aleramo, Deledda, Morante, and others. C-L: Comparative Area Studies and Women's Studies. One course. *Finucci*

107. Italian Short Fiction. (AL, FL) Novellas and short stories from the Middle Ages to the present. One course. *Finucci*

110. Advanced Readings and Composition. (FL) Practice in writing; introduction to the techniques of literary styles. One course. *Finucci*

111S. Special Topics in Advanced Language. (FL) Intensive instruction in Italian using newspapers, short stories, and films in order to enhance oral fluency. One course. *Caserta*

122. Topics in Italian Literature in Translation. (AL) Single authors, genres, movements, or themes. Topics to be announced. One course. *Finucci*

123. Aspects of Italian Literature. (AL) Concentration on single authors, periods, genres, regions, or themes. Topics to be announced. Offered only in the summer program in Florence, Italy. Taught in English. One course. *Finucci*

131. Topics in Italian Civilization. (CZ, FL) The institutions and culture of Italy throughout the centuries. Topics to be announced. C-L: Comparative Area Studies. One course. *Finucci*

139. Modern Italy. (CZ, FL) Political, social, economic, and cultural problems in Italian history from 1861 to the present. One course. *Caserta*

141S, 142S. Italian Literature. (AL, FL) Topics to be announced. Open to juniors and seniors. One course each. *Staff*

145S. Topics in Renaissance Literature and Culture. (AL, FL) Topics may include: epic, women writers, treatises, Petrarchism, theater. C-L: Medieval and Renaissance Studies. One course. *Finucci*

151. The Italian Theater. (AL, FL) Introduction to the Italian theatrical tradition. Content varies; six to eight plays from the Renaissance to the present. C-L: Drama 156. One course. *Finucci*

155S. Nineteenth-Century Italian Literature. (AL, FL) An historical and aesthetic appreciation of principal works of selected major Italian writers of the nineteenth century. C-L: Comparative Area Studies. One course. *Caserta*

170. Film and the Italian Novel. (AL, FL) Novels and classical narrative cinema. Topics such as novels and their cinematic versions, war, women's fiction and the

woman's picture, and neorealism in novel and film. C-L: Comparative Area Studies and Film and Video. One course. *Finucci*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

283. Italian Novel of the Novecento. (AL, FL) Representative novelists from Svevo to the most recent writers. One course. *Caserta*

284, 285. Dante. (AL, FL) 284: *La Vita Nuova* and a close reading of the *Inferno*. 285: The *Purgatorio* and the *Paradiso* in the light of Dante's cultural world. Special attention will be given to the poetic significance of the *Commedia*. Reading in Italian or English. Prerequisite: for 285, Italian 284 or equivalent. C-L: Medieval and Renaissance Studies. One course each. *Caserta*

PORTUGUESE (PTG)

21. Accelerated Elementary Portuguese. (FL) Basic grammar structures in one semester; emphasis on oral work. Prerequisite: four semesters of another foreign language or consent of instructor. One course. *Damasceno*

22. Accelerated Intermediate Portuguese. (FL) Review of basic grammar; emphasis on reading, with some practice in writing. Prepares students to enroll in courses at the 100 level. Prerequisite: Portuguese 21 or consent of instructor. One course. *Damasceno*

111S. Portuguese for Current Affairs. (FL) Advanced instruction in Portuguese using journalistic readings, film, and television, to improve fluency and to explore issues facing the Portuguese-speaking world. Prerequisite: Portuguese 22, or equivalent. One course. *Damasceno*

191, 192, 193, 194. Independent Study. One course each. *Staff*

200S. Seminar in Portuguese Literature. (AL, FL) Topics to be announced. One course. *Damasceno*

SPANISH (SP)

1-2. Elementary Spanish. (FL) Understanding, speaking, reading, and writing Spanish. Language laboratory available for recording-listening practice. Two courses. *Staff*

12. Review of Elementary Spanish. (FL) Intensive review of first-year Spanish. Open only to students with a placement or achievement score of 430-490. May not be taken for credit by students who have taken 1-2. One course. *Staff*

14. Intensive Study of Spanish. (FL) Covers the entire program of elementary Spanish study in one semester using a media-based approach. Primary focus on oral skill development, with additional work on reading and writing. Two courses. *Staff*

15. Intensive Spanish. (FL) Covers the entire program of intermediate language study in one semester using a media-based approach. Continued emphasis on oral skill development and the introduction of progressively longer and more challenging reading and writing activities. Prerequisite: Spanish 14 or the equivalent. Two courses. *Staff*

21. Accelerated Elementary Spanish. (FL) Basic grammar structures in one semester; emphasis on oral work. Prerequisite: four semesters or the equivalent of another foreign language or consent of instructor. One course. *Staff*

22. Accelerated Intermediate Spanish. (FL) Review of basic grammar; emphasis on reading, with some practice in writing. Prepares students to enroll in courses at the 100 level. Prerequisite: Spanish 21 or consent of instructor. One course. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

63. Intermediate Spanish. (FL) Grammar review, reading, and oral practice, including laboratory experience. Prerequisite: Spanish 2, 12, or achievement or placement test score of 500-570. One course. *Staff*

70, 71. Introduction to Literature. One or two course credits for advanced placement in literature. One course each.

76. Advanced Intermediate Spanish. (FL) Oral practice, reading, composition. Prerequisite: Spanish 63 or achievement or placement test score of 580-620. One course. *Staff*

101. Advanced Composition and Conversation. (FL) The refinement of written and oral expression through the analysis of literary texts. Continued development of vocabulary and the study of grammar in context. One course. *Staff*

104S. Spanish Language: Peninsular or American. (FL) Topics to be announced. One course. *Staff*

107S. Advanced Grammar. (FL) A systematic study of modern Spanish morphology and syntax. Offered only in the Duke in Madrid program. Not open to students who have taken Spanish 117S (Advanced Grammar). One course. *Staff*

108S. Advanced Colloquial Spanish. (FL) Colloquial Spanish as a catalyst of popular culture; extensive comparisons of English and Spanish popular sayings and proverbs; emphasis on oral communication. Not open to students who have taken Spanish 118S. Prerequisite: two Spanish courses at the 100 level. One course. *Garci-Gómez*

109S. Structure of Spanish. (FL) A systematic study of modern Spanish morphology and syntax with some readings in current linguistic theory. Not open to students who have taken Spanish 119S. Prerequisite: Spanish 101. C-L: Linguistics. One course. *Staff*

110S. Introduction to Literary Analysis. (AL, FL) Different genres, including narrative, poetry, drama, essay, film, and song. Texts will be drawn from different periods of Spanish and Spanish-American literature. Not open to students who have taken Spanish 100S. One course. *Staff*

111, 112. Introduction to Spanish Literature. (AL, FL) Major writers of the Spanish literary tradition. Poetry, fiction, theater, and essay. 111: Middle Ages through the seventeenth century. 112: eighteenth, nineteenth, and twentieth centuries. Not open to students who have taken Spanish 101, 102. One course each. *Garci-Gómez, Osuna, or staff*

113S, 114S. Discussion of Readings. (AL, FL) Selected topics. Open only to freshmen and sophomores. Not open to students who have taken Spanish 103S, 104S. Prerequisite: Spanish 76 or placement/achievement score of 630+. One course each. *Staff*

115, 116. Introduction to Spanish-American Literature. (AL, FL) A survey of major writers and movements from the period of discovery to the present day. 115: the periods of conquest, colonial rule, and early independence. Includes works by native Indian, *mestizo*, and women writers. 116: from *modernismo* to the contemporary period. Not open

to students who have taken Spanish 105, 106. C-L: Comparative Area Studies. One course each. *Staff*

117S. Spanish-American Short Fiction. (AL, FL) Novellas and short stories of the nineteenth and twentieth centuries: Martí, Darío, Quiroga, Borges, Cortázar, García Márquez, Allende, Ferré, Carpentier, and others. Not open to students who have taken Spanish 107S (Spanish-American Short Fiction). One course. *Pérez Firmat or staff*

120S. Contemporary European Issues. (CZ) An interdisciplinary seminar addressing topics of European culture. Taught in English. Offered only in the Duke in Madrid program. Consent of instructor required. One course. *Staff*

121. Latin-American Literature in Translation. (AL) Fictional and poetic works of the last thirty years that have made an impact on world literature. Taught in English. C-L: Comparative Area Studies and Literature 129. One course. *Dorfman*

131. Topics of Hispanic Civilization. (CZ, FL) A humanistic study of Spain or Spanish America through history, culture, people, and institutions. C-L: Comparative Area Studies. One course. *Staff*

137. Aspects of Contemporary Spanish Culture. (CZ, FL) Offered only as part of the summer program in Spain. C-L: Comparative Area Studies. One course. *Garcí-Gómez*

138S. The Spanish Civil War in History and Literature. (AL, FL) An examination of the Spanish Civil War of 1936-39 through literary and historical readings, and through its representation in art, music, and film. One course. *Sieburth*

141S, 142S. Spanish Literature. (AL, FL) Topics to be announced. Open to juniors and seniors. One course each. *Staff*

143S. Literature of the Discovery and Conquest of America. (AL, FL) Prose and poetry from the sixteenth through eighteenth centuries, exploring the idea of the New World from conquest to independence. C-L: Comparative Area Studies. One course. *Staff*

144S. Spanish-American Literature of Identity. (AL, FL) Exploration of the concepts of *lo criollo* or *lo americano*, essentially through the analysis of texts by Arriví, Carpentier, Neruda, Paz, and others. C-L: Comparative Area Studies. One course. *Pérez Firmat*

145S. Literature of the Hispanic Minorities of the United States. (AL, FL) Representative Spanish-language works by Puerto Rican, Cuban-American and Chicano writers. C-L: Comparative Area Studies. One course. *Pérez Firmat*

146. The Spanish-American Novel. (AL, FL) Masterworks of the twentieth century. C-L: Comparative Area Studies. One course. *Moreiras or staff*

147S. Latin American Women Writers. (AL, FL) Exploration of common themes across the region, such as family, love, feminism, and violence. May include only contemporary writers or cover authors from earlier periods as well. May study Brazilian writers in Spanish or in English translation. May concentrate on narrative or include poetry and drama. Open only to juniors and seniors. C-L: Comparative Area Studies and Women's Studies. One course. *Staff*

148. Colonial and Postcolonial Studies in Latin America and the Caribbean. (CZ, FL) Focus on Western colonial expansion since the sixteenth century and on the national periods, following the movement of independence. Cultural differences of colonial and postcolonial experiences; transition from colonial to postcolonial regimes. Languages and literatures, history of ideas, cartography, and the social imaginary expressed in everyday life, from architecture to clothing, from rules of social behavior to ecological consciousness. Limited to juniors and seniors. One course. *Mignolo*

151. Spanish Literature of the Renaissance and the Baroque. (AL, FL) Selected works of the sixteenth and seventeenth centuries with attention to their reflection of social, religious, and political ideas. C-L: Medieval and Renaissance Studies. One course. *Staff*

153. Golden Age Literature: Cervantes. (AL, FL) Emphasis on the *Quijote*. C-L: Medieval and Renaissance Studies. One course. *Staff*

169. Topics in Nineteenth- and Twentieth-Century Spanish Literature. (AL, FL) Focus on a specific genre or theme to be announced. One course. *Sieburth or Vilarós*

171. Literature of Contemporary Spain. (AL, FL) A cultural critique of contemporary Spain (1936 to present) through different literary genres (novel, theater, poetry). Authors include Celaya, Otero, Arrabal, Rodoreda, Goytisolo, and Martín-Gaité. C-L: Comparative Area Studies. One course. *Vilarós*

175S. Hispanic Literature and Popular Culture. (AL, FL) Works of Spanish and Latin American fiction that parody or rewrite popular culture genres such as serial novels, detective stories, or Hollywood films. Authors include Cervantes, Galdós, Borges, Marsé, and Puig. One course. *Sieburth*

176S. Disenchanted Texts: Spanish Literature 1975-1990. (AL, FL) Study of some of the literary works written in Spain between 1975 (year of Franco's death) and 1990, a period of political transition and social disenchantment. How this specific disenchantment is present in literary texts as an expression of an unconscious and repressed mourning for the dictator as a father figure, as a nostalgia for a conflictive past, and as a confrontation with an uncertain present and future. Postdictatorship works of authors born in the 1920s and 1930s read alongside literary productions of the generation born after 1950. Authors include Goytisolo, Gil de Biedma, Vázquez Montalbán, Espinosa, Montero, Jaén, Ortiz, and others. One course. *Vilarós*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and director of undergraduate studies. One course each. *Staff*

195. Topics in Spanish Literature and Culture. (AL, FL) Topics to be announced. Offered only in the Duke in Madrid Program. One course. *Staff*

200S. Seminar in Spanish Literature. (AL, FL) Topics to be announced. One course. *Staff*

210. History of the Spanish Language. (FL) Formation and development. Internal forces and external contributions. C-L: Comparative Area Studies, Linguistics, and Medieval and Renaissance Studies. One course. *Garci-Gómez*

244. Topics in Twentieth-Century Latin-American Fiction. (AL, FL) Study of various critical problems in the narrative of the area. Focus on one or more major issues, such as the representation of violence, magical realism, *indigenismo*, *novela de la tierra*. Prerequisite: Spanish 106. One course. *Moreiras*

245. Latin-American Poetry. (AL, FL) Focus on major movements and authors. Non-mainstream poetical traditions, such as poetry written in Quechua, oral poetry. Prerequisite: Spanish 106. C-L: Comparative Area Studies. One course. *Moreiras or staff*

248. Studies in Spanish-American Literature. (AL, FL) Concentration on single authors, genres, movements, or themes. One course. *Staff*

250. Latin-American Film. (AL, FL) Study of Latin-American film through selected films and critical texts. Attention paid to contemporary production given availability, such as the work of Raúl Ruiz, Miguel Littin, Eliseo Subiela. One course. *Moreiras and staff*

275. Modern Spanish Poetry. (AL, FL) Juan Ramón Jiménez, Unamuno, Antonio Machado, the Generation of 1927, and the contemporary poets. One course. *Osuna*

Courses Currently Unscheduled

133S. Spanish-American Civilization. (CZ, FL)

163. The Generation of 1898. (AL, FL)

165S. Major Spanish Authors. (AL, FL)

166. Nineteenth-Century Prose Fiction. (AL, FL)

262. The Romantic Movement. (AL, FL)

276. Modern Spanish Drama. (AL, FL)

277. Modern Spanish Novel. (AL, FL)

ROMANCE STUDIES (RS)

Courses Currently Unscheduled

218. The Teaching of Romance Languages

THE MAJOR

Majors are offered in French Studies, Italian Studies, and Spanish. The French Studies and Spanish majors offer several different tracks, as described below.

Prerequisite. French, Italian, or Spanish 22, 76, or equivalents.

French Studies Major Requirements. The French Studies major offers two tracks: (1) French Studies and (2) French and European Studies.

(1) *French Studies.* *Prerequisites:* French 100 or equivalent (grade of A- or above in French 22 or 76, AP literature score of 5, achievement test score of 620 or above, or comparable linguistic experience). *The Major:* A total of eight courses from departmental French offerings numbered 101 or above. These must include two survey courses (either 101 or 105 and either 102 or 106), and at least three courses above the 140 level. Participation in Option Française courses is recommended when they are offered.

(2) *French and European Studies.* An interdisciplinary track requiring a total of ten courses. Seven courses must be from departmental French offerings numbered 101 or above. At least three of the seven French courses must be above the 140 level. Three courses on European topics (at or above the 100 level) must be taken in other departments (consult the undergraduate French advisor for the list of approved courses). Participation in Option Française courses is recommended when they are offered. Proficiency in another European language is highly desirable.

Italian Studies Major Requirements. A total of eight courses from departmental Italian offerings numbered 100 or above. These must include at least two Italian courses above 140. Up to three approved courses on Italian topics offered by other departments may be counted toward the major (consult the undergraduate Italian advisor for the list of approved courses).

Spanish Major Requirements. The Spanish major offers three tracks: (1) Spanish, (2) Spanish and Latin American Studies, and (3) Spanish and European Studies.

(1) *Spanish*. A total of eight courses from departmental Spanish offerings numbered above 100. These must include 101, any two of the survey sequences (111, 112, 115, 116) and at least three courses above 140.

(2) *Spanish and Latin American Studies*. An interdisciplinary track requiring a total of ten courses. Seven courses must be from departmental Spanish offerings numbered 101 or above. These must include 101, one survey course (115 or 116), and at least three Latin American literature or culture courses above 140. Three courses on Latin American topics at or above the 100 level must be taken in other departments (consult the undergraduate Spanish advisor for the list of approved courses). A Brazilian literature course at or above the 100 level offered by the department may count as one of the courses taken within the department. Proficiency in Portuguese is highly desirable.

(3) *Spanish and European Studies*. An interdisciplinary track requiring a total of ten courses. Seven courses must be from departmental Spanish offerings numbered 101 or above. These must include 101, one survey course (111 or 112), and at least three Peninsular literature or culture courses above 140. Three courses on European topics at or above the 100 level must be taken in other departments (consult the undergraduate Spanish advisor for the list of approved courses). Proficiency in another European language is highly desirable.

Courses numbered 120 through 129 are taught in English and do not count toward the major (French and Spanish only). Course numbers 181 and 182 (now renumbered as 21, 22) do not count toward the major (French, Spanish, and Italian).

Study Abroad. Students are strongly urged to study abroad since this is the best way to achieve language proficiency and to acquire knowledge of a country's culture. A maximum of two courses per semester, or one per summer, may be counted toward the major. (The summer course restriction does not apply to Duke-administered programs.)

Suggested Work in Related Disciplines. In order to give perspective to a student's program, majors in French or Spanish will normally select, with the approval of the major advisor, appropriate courses from such fields as: (1) other languages and literatures; (2) history; (3) philosophy; (4) music and art; and (5) linguistics.

OPTION FRANÇAIS

Option Français is an offering of courses taught in French. Unlike the French courses offered by the Department of Romance Studies, however, in which language or literature is the essential subject matter, these are courses in various departments where French is simply the medium of instruction. Prerequisite: French SAT score of 600 (or the same score on the Placement Test), a score of 4 on the Advanced Placement Test in French, or prior completion of a French course numbered above 70. Option Français courses appear in the listings of the departments. They meet area of knowledge requirements as these are specified elsewhere in the undergraduate bulletin. They do not meet requirements for the major in French. Students interested in the program should consult the director of undergraduate studies in Romance studies.

Russian

For courses in Russian, see Slavic Languages and Literatures.

Science, Technology, and Human Values Program

Professor Vesilind, *Director*

A certificate, but not a major, is available in this program.

The Program in Science, Technology, and Human Values offers students the opportunity to develop a comprehensive view of science, medicine, or technology in social, historical, and ethical terms. Although a major is not available in this program, the course

of study will enrich the understanding of one's profession for the future scientist, physician, or engineer, and for others it will broaden their appreciation of activities in these areas.

COURSE OF STUDY

Duke courses pertinent to the program are classified according to their approach: ethical, analytical (historical, philosophical, or sociological), or policy-centered. Each student entering the program designates, for purposes of advising, an area of primary interest and then selects a program of five courses (four for engineering majors) covering all three approaches. Individual programs, selected from more than fifty courses, are tailored to each student's interests. Students in the program focus their course work and individual interests through an interdisciplinary seminar offered in the senior year (Interdisciplinary Course 108S). A seminar consisting of six varied topics in science, technology, and the humanities is offered as a course for undergraduates (Interdisciplinary Course 112S, 113S). Full details concerning the program and courses in science, technology, and human values may be obtained by writing or calling the director.

ELIGIBILITY AND CERTIFICATION

Students may apply to the program at any time. To students who complete the program, Duke University gives official recognition of their participation.

Slavic Languages and Literatures

Associate Professor Pugh, *Chair*; Associate Professor Andrews, *Director of Undergraduate Studies*; Associate Professors Dobrenko and Lahusen; Assistant Professor Gheith; Associate Professor Emeritus Jezierski; Assistant Professors of the Practice Flath, Maksimova, and Van Tuyl

A major is available in this department.

RUSSIAN (RUS)

1-2. Elementary Russian. (FL) Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Staff*

4, 5. Elementary Russian Conversation. (FL) Introduction to spoken Russian with emphasis on basic conversational style and increasing vocabulary. Half course each. *Staff*

14. Intensive Russian. (FL) Russian 1 and 2 combined in one semester. Two meetings daily, as well as daily computer and language laboratory work. Two courses. *Staff*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

61S, 62S. Intermediate Russian Language and Culture. (CZ, FL) Intensive classroom practice in phonetics, conversation, and grammar. Literature, films, museums, and theater performances. (Taught in St. Petersburg in Russian and English depending on placement.) Prerequisite: Russian 2 or equivalent. One course each. *Staff*

63, 64. Intermediate Russian. (FL) Intensive classroom and laboratory practice in spoken and written patterns. Reading in contemporary literature. Prerequisites: Russian 1 and 2, or two years of high school Russian. One course each. *Staff*

66, 67. Intermediate Russian Conversation. (FL) Consolidation of oral skills. Intensive conversation on a broad range of topics. Prerequisites: Russian 1 and 2, or equivalent. Half course each. *Staff*

70. Intensive Intermediate Russian. (FL) Russian 63 and 64 combined. Two meetings daily, as well as daily computer and language laboratory work. Two courses. *Staff*

100S. Russian Phonetics. (FL) Analysis of contemporary standard Russian literary pronunciation, phonology, and intonational structures. Prerequisite: Russian 64 or consent of instructor. One course. *Staff*

101S, 102S. Contemporary Russian Composition and Readings. (FL) Advanced grammar and syntax with intense composition component. Analytical readings in the original. Prerequisites: for 101S, Russian 63 and 64, or equivalent; for 102S, Russian 101S. One course each. *Staff*

103S, 104S. Studies in the Russian Language and Culture. (CZ, FL) Analytical readings including grammatical and textual analysis. Additional work in phonetics and conversation. Literature, films, museums, and theater performances. (Taught in St. Petersburg in Russian.) Prerequisite: Russian 64 or equivalent. C-L: Comparative Area Studies. One course each. *Staff*

105, 106. Third-Year Russian Conversation. (FL) Conversation course for students enrolled in Russian 101, 102. Not open to students currently taking Russian 63, 64 or Russian 195, 196. Half course each. *Staff*

110. Intensive Russian Composition and Readings. (AL, FL) Russian 101S and 102S combined in one course. Two meetings daily, as well as daily language laboratory work. Two courses. *Staff*

111S, 112S. Senior Honors Seminar. Introduction to methods of research and writing, including selection of thesis topics, preliminary research and organization, and writing of the thesis. Consent of the director of undergraduate studies required. One course each. *Staff*

115. Russian Language Studies in St. Petersburg. (FL) Russian grammar and composition taught only in St. Petersburg for students participating in the semester program. One course. *Staff*

121S, 122S. Introduction to Russian Literature. (AL, FL) Major works in Russian literature including prose and poetry. Prerequisite: Russian 63, 64 or equivalent. One course each. *Staff*

129. Russian Orthodoxy. (CZ) The belief systems and the history of the Russian Orthodox Church. The relationship between orthodoxy and Russian secular culture, including the response of several Russian writers. Taught in English. C-L: Religion 126. One course. *Pelach*

130. Soviet Cinema. (AL) History of Soviet film industry from silent to sound period. Overview of major theorist-filmmakers: Eisenstein, Pudovkin, Vertov. Issues of reception, audience, politics, form, national and ethnic identities. Taught in English. C-L: Film and Video and Literature 178. One course. *Gaines, Jameson, and Lahusen*

131. Language, Culture, and Myth: The Slavic Proverb. (AL) The sources of the Slavic proverb, the proverb as microtext of national stereotypes, and its function in modern literature and culture. Problems of translation. Taught in English. C-L: Comparative Area Studies. One course. *Staff*

135. Contemporary Russian Media. (FL, SS) Analytical readings and study of change and development in all the primary forms of mass media in the former Soviet Union from 1985 to present (newspapers, journals, and television). Topics include censorship, TASS, samizdat. Taught in English, readings in Russian. Prerequisite: Russian 64 or equivalent. C-L: Comparative Area Studies. One course. *Andrews*

135A. Contemporary Russian Media. (FL, SS) Same as Russian 135 but taught only in St. Petersburg. Prerequisite: Russian 64 or equivalent. C-L: Comparative Area Studies. One course. *Staff*

141, 142. Teaching Practicum. Introduction to teaching Russian. Practical classroom teaching experience in local elementary schools. Weekly sessions on teaching methodology. Consent of instructor required. One course each. *Andrews*

145. Theory and Practice of Translation. (FL) Overview of the scholarly literature on translation combined with a program of practical translation exercises. Prerequisite: three years of Russian language study or consent of instructor. One course. *Flath*

151, 152. Fourth-Year Russian Conversation. (FL) Conversation course for students who are enrolled in, or have completed, Russian 195, 196. Half course each. *Staff*

155. The Interaction of Russian and American Culture. (AL) Addresses the broad, interdisciplinary issue of identity and otherness while studying specifically what happens when the cultures of Russia and the United States come into contact. Taught in English. C-L: Comparative Area Studies. One course. *Lahusen and Van Tuyl*

157. Law, Culture, and the Russian Legal Tradition. (CZ) A study of the development of the Russian legal tradition, with particular emphasis on the historical and cultural factors that have contributed to its emergence, comparing the Russian tradition with the Western legal tradition. How law, lawyers, and legal institutions have been portrayed in Russian popular culture, especially Russian literature. Taught in English. One course. *Newcity*

161, 162. Nineteenth-Century Russian Literature. (AL) Selected nineteenth-century authors, works, and genres. Authors include Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Tolstoy, and Chekhov. Taught in English. C-L: Comparative Area Studies. One course each. *Staff*

163. Literature of Former Soviet Republics. (AL) Ukrainian realism of the nineteenth century, futurism, neoclassicism, and the literary struggle of the 1920s; Belorussian literature; Lithuanian psychological prose; the Estonian experimental novel; Georgian literature from Rustaveli to the philosophical novel of the 1970s; the work of Chingiz Aitmatov; Soviet "recent literacy." Taught in English. C-L: Comparative Area Studies. One course. *Dobrenko*

168S. Russian Classical Literature and Music. (AL) The interaction of literary and musical texts. Includes literary texts by Pushkin, Lermontov, Gogol, Leskov and musical texts (operas) by Chaikovsky, Borodin, Glinka, Musorgski, Rimsky-Korsakov, Rubinstein, and Shostakovich. Taught in English. C-L: Comparative Area Studies. One course. *Dobrenko*

169. Women and Russian Literature. (AL) Women authors in Russia from the eighteenth century to the present: their works and lives. The role that works by women have played in Russian literature and culture. The question of whether women's writing in Russia constitutes a tradition. Authors include Dashkova, Catherine the Great, Kovalevskaja, Kollontai, Chukovskaia, Akhmatova, Petrushevskaja, and Tolstaia. Taught in English. C-L: Comparative Area Studies and Women's Studies. One course. *Gheith*

170. Russian Dissident and Emigré Literature. (AL) The literature of opposition in Russia during the nineteenth and twentieth centuries, from Chaadaev and Chernyshevsky to Grossman, Solzhenitsyn, and Zinoviev. Taught in English. C-L: Comparative Area Studies. One course. *Lahusen*

172S. Pushkin and His Time. (AL) Pushkin and the literary revolution around 1830. Prose works (*The Tales of Belkin*, *The Queen of Spades*, *The Captain's Daughter*) and major lyrical poetry. Taught in English. C-L: Comparative Area Studies. One course. *Gheith or Van Tuyl*

173S. Gogol. (AL) Life, works, and criticism. Readings include *Dead Souls*, *The Inspector General*, *Petersburg Tales*, and other short fiction. Taught in English. C-L: Comparative Area Studies. One course. *Lahusen*

175. Tolstoy. (AL) Introduction to life, works, and criticism. Readings include: *War and Peace*, *Anna Karenina*, the shorter fiction, dramatic works and essays. Taught in English. C-L: Comparative Area Studies. One course. *Van Tuyl*

176. Dostoevsky. (AL) Introduction to life, works, and criticism. Readings include: *Crime and Punishment*, *The Idiot*, and *The Brothers Karamazov*. Taught in English. C-L: Comparative Area Studies. One course. *Flath, Gheith, or Van Tuyl*

177S. Chekhov. (AL) Drama and prose works. Taught in English. Not open to students who have taken Russian 174S (Chekhov). C-L: Comparative Area Studies and Drama 157S. One course. *Flath or staff*

178. Russian Short Fiction. (AL) The history, development, and shifts of Russian short fiction in the nineteenth and twentieth centuries. Authors include Dostoevsky, Vovchok, Leskov, Chekhov, Gippius, and Zoshchenko. Topics include gender, genre, and national identity in historical/cultural context. Taught in English. C-L: Comparative Area Studies. One course. *Gheith*

179S. Selected Topics in Russian Literature. (AL) Women writers of the twentieth century, Soviet film, *samizdat/tamizdat*, the Petersburg paradigm in Russian literature and culture. Taught in English. One course. *Staff*

180. Early Twentieth-Century Russian Literature: From Symbolism to the 1920s. (AL) Symbolism, acmeism, futurism, imagism, proletarian literature. Authors include Bely, Sologub, Blok, Vyacheslav Ivanov, Akhmatova, Mandelshtam, Mayakovsky, Khlebnikov, Gorky, Bogdanov, Gastei. Taught in English. C-L: Comparative Area Studies. One course. *Lahusen or staff*

181. The 1920s: The Road to a New Synthesis. (AL) The literary struggle of the 1920s; proletarian literature from the Smithy to RAPP, LEF and the fate of the avant-garde, the aesthetic conception of Pereval, the literature of the absurd, Oberiu and the Serapion Brothers. Authors include Kirillov, Gladkov, Babel, Pilnyak, Olesha, Zamyatin, Platonov, Kharms, and Pasternak. Taught in English. Not open to students who have taken the former Russian 181, Early Twentieth-Century Russian Literature. C-L: Comparative Area Studies. One course. *Dobrenko or Lahusen*

182. Socialist Realism: Soviet Literature of the 1930s and 1940s. (AL) The Stalin era of Russian literature, the genesis and development of socialist realism, Soviet literature and the themes of boundaries and war. Authors include Sholokhov, Ostrovsky, Fadeev, Azhaev, Babaevsky, Kochetov, and Simonov. Taught in English. C-L: Comparative Area Studies. One course. *Dobrenko or Lahusen*

183. Post-Stalinist and Contemporary Soviet Literature. (AL) Literature of the thaw after Stalin: the young prose, little realism, new modernism, and rural prose. Authors include Aksyonov, Trifonov, Baranskaya, Bitov, Solzhenitsyn, Rasputin, Shukshin, and Zalygin. Taught in English. C-L: Comparative Area Studies. One course. *Dobrenko or Lahusen*

184. Late- and Post-Soviet Literature. (AL) From the "recovered" avant-garde to the new literature during the Gorbachev era and beyond. The unmasking of Soviet

history and its aestheticization. Underground literature and Soviet postmodernism. Authors include Rybakov, Pietsukh, Petrushevskaya, Kuraev, Tolstaya, Viktor Erofeyev, Makanin, Prigov, and Narbikova. Readings in English. C-L: Comparative Area Studies and Linguistics. One course. *Dobrenko, Gheith, or Lahusen*

185S. Introduction to Slavic Linguistics. (FL) Basic introduction to linguistic terminology; emphasis on synchronic linguistic theory in the East, West, and South Slavic areas. Phonological, morphological, and syntactic structure of contemporary standard Russian. Readings in English and Russian. C-L: Comparative Area Studies and Linguistics. One course. *Andrews*

186S. History of the Russian Language. (FL) The development of the Russian language from the eleventh century, with consideration of the origins of modern literary and dialectal features. Readings in Russian. Prerequisite: second year Russian or consent of instructor. C-L: Comparative Area Studies and Linguistics. One course. *Pugh*

187. Intensive Advanced Russian. (FL) Advanced grammar review with an emphasis on the refinement of oral and written language skills. Development of writing style through compositions and essays. Prerequisite: Russian 102S or consent of instructor. Two courses. *Andrews*

188S, 189S. Advanced Russian Language and Culture. (CZ, FL) Advanced grammar review with additional emphasis on phonetics and conversation. Literature, films, museums, and theater performances. (Taught in St. Petersburg in Russian.) Prerequisite: Russian 102S or equivalent. C-L: Comparative Area Studies. One course each. *Staff*

190. Introduction to Russian Civilization. (CZ) Basic knowledge of Russian society, history of ideas, folklore tradition, orthodoxy, and history of Russian readership. Taught in English. C-L: Comparative Area Studies and History 146. One course. *Pelech*

191, 192. Independent Study. Directed reading and research. Open only to qualified students by consent of director of undergraduate studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Consent of director of undergraduate studies required. One course each. *Staff*

195. Advanced Russian. (FL) Advanced grammar review with an emphasis on the refinement of oral and written language skills. Development of writing style through compositions and essays. Prerequisite: Russian 102S or consent of instructor. C-L: Comparative Area Studies. One course. *Andrews*

196. Advanced Russian: Readings, Translation, and Syntax. (FL) Intensive reading and conversation with emphasis on contemporary Russian literary and Soviet press texts. English-Russian translation stressed. Russian media, including television and films. Prerequisite: Russian 195 or consent of instructor. C-L: Comparative Area Studies. One course. *Andrews*

197. Russian Poetry. (AL) Focus on nineteenth and twentieth centuries, including the Golden Age and the Silver Age. Authors include Pushkin, Lermontov, Bely, Blok, Akhmatova, Tsvetaeva, Mandelstam, Pasternak, and Mayakovsky. Taught in English or Russian, according to students' Russian language proficiency. Russian texts. One course. *Staff*

198, 199. Russian Stylistics and Conversation. (AL, FL) Refinement of stylistic control and range in spoken and written Russian. Emphasis on fluent discursive skills, as well as development of expository prose style. Prerequisites: Russian 195 and 196, or consent of instructor. One course each. *Maksimova*

For Seniors and Graduates

201S. Topics in Comparative Slavic Linguistics. (SS) A cycle of survey courses on the phonology, morphology, and dialects of the Slavic languages. Taught in English. Readings in Russian. A. East Slavic B. West Slavic C. South Slavic D. Common Slavic C-L: Linguistics. One course. *Andrews or Pugh*

203S. Old Church Slavonic. (FL) Introduction to the language of the earliest Slavic texts. Close study of phonological and morphological systems, reading of texts and discussion. Taught in English. C-L: Linguistics and Religion 229S. One course. *Pugh*

204S. Russian Folklore and Popular Culture. (CZ, FL) Work songs and ritual songs, lamentations, riddles, and proverbs. Tales and later forms of popular creation (*chastushki*, anecdotes, urban romance) and their function in Russian culture. Taught in Russian. One course. *Staff*

205. Semiotics and Linguistics. (SS) A survey of modern semiotics, particularly the works of C. S. Peirce and Umberto Eco. Semiotic works directly related to modern linguistic thought and linguistic sign theory. Emphasis on the interdisciplinary aspects of semiotic theory. C-L: English 205 and Linguistics. One course. *Andrews*

208. Stylistic and Compositional Elements of Scholarly Russian. (FL) Introduction to Russian texts and terminology including business, economics, law, history, political sciences, psychology, linguistics, and literary criticism. Prerequisite: Russian 64 or consent of instructor. One course. *Maksimova*

209. Intensive Advanced Stylistics. (AL, FL) Refinement of stylistic control and range in spoken and written Russian. Emphasis on fluent discursive skills, as well as development of expository prose style. Prerequisites: Russian 195 and 196, or consent of instructor. Two courses. *Maksimova*

210. Literature and Criticism of Socialist Realism. (AL) The genesis and development of Soviet socialist realism. A survey of Soviet literary theories from Lunacharsky to Ovcharenko, and contemporary Western criticism (for example, K. Clark, R. Robin). A critical approach to the dialogic alternative to monologic literature through literary illustration (selected Soviet literary works from the 1930s to the present day). Taught in English. One course. *Lahusen*

211. Business Russian. (CZ, FL) Introduction to Russian language and culture for conducting business in or with Russia and other Commonwealth of Independent States countries. Primary materials include contracts, advertising, and financial documents. One course. *Maksimova*

212S. Proseminar. (AL) Introduction to research methodologies, professional skills (including discussions of teaching), as well as a theoretical basis for students in Slavic linguistics and literature. Mandatory for all graduate students and open to upper-level undergraduates. Team taught; taught in English and Russian. One course. *Staff*

213. Silver Age of Russian Literature. (AL) Poetics of symbolism, acmeism, futurism, imagism, and formalism. Representative world views and critical and artistic methods. Students of Slavic and Russian will read the materials in the original language. One course. *Mickiewicz*

214. Gender, Nationalities, and Russian Literary Traditions. (AL, CZ) Russian literature of the nineteenth and twentieth centuries compared with both "Western" and "Eastern" literature of the same time period, including questions of national identity. Readings include: Pushkin, Lermontov, Tur, Aitmatov, and Iskander. C-L: Literature 214 and Women's Studies. One course. *Gheith*

230. Soviet Cinema. (AL) History of Soviet film industry from silent to sound period. Overview of major theorist-filmmakers: Eisenstein, Pudovkin, Vertov. Issues of reception, audience, politics, form, national and ethnic identities. Taught in English. One course. *Gaines, Jameson, and Lahusen*

240S. Russian Literary Discourse. (AL) Nineteenth- and twentieth-century Russian literary theory, with close readings in the original. Application to fiction. Taught in English. One course. *Lahusen*

250. Trends in Russian and East European Literary Criticism and Beyond. (AL) The major critical movements in the nineteenth and twentieth centuries in Russia, East-Central Europe, and the West. Authors and theories include the Belinsky school, formalism, Bakhtin, structuralism, semiotics, and psychoanalytic and feminist theory. Taught in English. One course. *Gheith*

257. Law, Culture, and the Russian Legal Tradition. (CZ) A study of the development of the Russian legal tradition, with particular emphasis on the historical and cultural factors that have contributed to its emergence, comparing the Russian tradition with the Western legal tradition. How law, lawyers, and legal institutions have been portrayed in Russian popular culture, especially Russian literature. Taught in English. One course. *Newcity*

261, 262. Nineteenth-Century Russian Literature. (AL) Selected nineteenth-century authors, works, and genres. Authors include Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Tolstoy, and Chekhov. Taught in English. Readings in Russian. One course each. *Staff*

265S. Literature of Early Russia. (AL) Works from the eleventh to the seventeenth centuries, including Ilarion's *Sermon on Law and Grace*, *The Tale of Bygone Years*, *The Igor Tale*, *Domostroi*, *Avvakum's Life*. Readings in Russian. One course. *Staff*

266S. The Sources of Modern Russian Literature: The Eighteenth Century. (AL) Development of the major forms of Russian literature, including verse, drama, and the beginnings of the prose tradition. Authors include Kantemir, Lomonosov, Sumarokov, Trediakovsky, Fonvizin, Derzhavin, and Karamzin. Readings in Russian. One course. *Gheith*

269. Women and Russian Literature. (AL) Women authors in Russia from the eighteenth century to the present: their works and lives. The role that works by women have played in Russian literature and culture. The question of whether women's writing in Russia constitutes a tradition. Authors include Dashkova, Catherine the Great, Kovalevskaia, Kollontai, Chukovskaia, Akhmatova, Petrushevskiaia, and Tolstaia. Taught in English. Readings in Russian. C-L: Comparative Area Studies and Women's Studies. One course. *Gheith*

272S. Pushkin and His Time. (AL) Pushkin and the literary revolution around 1830. Prose works (*The Tales of Belkin*, *The Queen of Spades*, *The Captain's Daughter*) and major lyrical poetry. Taught in English. Readings in Russian. One course. *Gheith or Van Tuyl*

273S. Gogol. (AL) Life, works, and criticism. Readings include *Dead Souls*, *The Inspector General*, *Petersburg Tales*, and other short fiction. Readings in Russian. One course. *Lahusen*

275. Tolstoy. (AL) Introduction to life, works, and criticism. Readings include: *War and Peace*, *Anna Karenina*, the shorter fiction, dramatic works and essays. Taught in English. Readings in Russian. One course. *Van Tuyl*

276. Dostoevsky. (AL) Introduction to life, works, and criticism. Readings include: *Crime and Punishment*, *The Idiot*, and *The Brothers Karamazov*. Taught in English. Readings in Russian. C-L: Comparative Area Studies. One course. *Flath, Gheith, or Van Tuyl*

277S. Chekhov. (AL) Drama and prose works. Readings in Russian. One course. *Flath*

278. Russian Short Fiction. (AL) The history, development, and discontinuities of Russian short fiction in the nineteenth and twentieth centuries. Authors include Dostoevsky, Vovchok, Leskov, Chekhov, Gippius, and Zoshchenko. Topics include gender, genre, and national identity in historical/cultural context. Taught in English. C-L: Comparative Area Studies. One course. *Gheith*

279S. Literature of the Former Soviet Republics. (AL) Ukrainian realism of the nineteenth century, futurism, neoclassicism, and the literary struggle of the 1920s; Belorussian literature; Lithuanian psychological prose; the Estonian experimental novel; Georgian literature from Rustaveli to the philosophical novel of the 1970s; the work of Chingiz Aitmatov; Soviet "recent literacy." Taught in Russian. One course. *Dobrenko*

280. Early Twentieth-Century Russian Literature: From Symbolism to the 1920s. (AL) Symbolism, acmeism, futurism, imagism, proletarian literature. Authors include Bely, Sologub, Bryusov, Blok, Vyacheslav Ivanov, Khodasevich, Akhmatova, Mandelshtam, Mayakovsky, Khlebnikov, Gorky, Bogdanov, Gastei. Readings in Russian. One course. *Lahusen*

281. The 1920s: The Road to a New Synthesis. (AL) The literary struggle of the 1920s; proletarian literature from the Smithy to RAPP, LEF and the fate of the avant-garde, the aesthetic conception of Pereval, the literature of the absurd, Oberiu and the Serapion Brothers. Authors include Kirillov, Gladkov, Babel, Pilnyak, Olesha, Zamyatin, Platonov, Kharms, and Pasternak. Readings in Russian. One course. *Dobrenko or Lahusen*

282. Socialist Realism: Soviet Literature of the 1930s and 1940s. (AL) The Stalin era of Russian literature, the genesis and development of socialist realism, Soviet literature and the theme of boundaries and war. Authors include Sholokhov, Ostrovsky, Fadeev, Azhaev, Babaevsky, Kochetov, and Simonov. Readings in Russian. One course. *Dobrenko or Lahusen*

283. Post-Stalinist and Contemporary Soviet Literature. (AL) Literature of the thaw after Stalin: the young prose, little realism, new modernism, and rural prose. Authors include Aksyonov, Trifonov, Baranskaya, Bitov, Solzhenitsyn, Rasputin, Shukshin, and Zalygin. Readings in Russian. C-L: Comparative Area Studies. One course. *Dobrenko or Lahusen*

284. Late- and Post-Soviet Literature. (AL) From the "recovered" avant-garde to the new literature during the Gorbachev era and beyond. The unmasking of Soviet history and its aestheticization. Underground literature and Soviet postmodernism. Authors include Rybakov, Pietsukh, Petrushevskaya, Kuraev, Tolstaya, Viktor Erofeev, Makanin, Prigov, and Narbikova. Readings in Russian. One course. *Dobrenko, Gheith, or Lahusen*

285. Babel and the Russian-Jewish Cultural Dialogue of the Twentieth Century. (AL) The Jews and the Russian revolution. The Odessa school in the literature of the 1920s. Works include *Red Cavalry*, *Odessa Stories*, and *The Sunset*. Readings in English or Russian. One course. *Dobrenko*

286S. Zamyatin. (AL) The novel *We*, short fiction, and essays. Taught in English. Readings in English or Russian. Not open to students who have taken the former Russian 177S/277S (Zamyatin). One course. *Andrews, Maksimova, or Lahusen*

287S. Platonov. (AL) The novels *Chevengur*, *The Foundation Pit*, and shorter fiction. Taught in English. Readings in English or Russian. One course. *Lahusen*

288S. Bulgakov. (AL) Works include *Master and Margarita*, *The White Guard*, *A Theatrical Novel*, and *The Heart of a Dog*. Readings in English or Russian. One course. *Andrews, Maksimova, and staff*

290. Trifonov, or the Life and Death of the Soviet Intelligentsia. (AL) The Russian and Soviet intelligentsia, its role and historical responsibility, depicted by one of the most visible representatives of the "generation of the sixties." Works include *The Exchange*, *Taking Stock*, *The Long Goodbye*, *Another Life*, *The House on the Embankment*, *The Old Man*. Readings in Russian. One course. *Dobrenko*

298. Akhmatova. (AL) The works and times of Anna Akhmatova, the most prominent woman poet in Russian history. Focus on Akhmatova's works and the Russian political and artistic milieu of the 1910s and 1920s, socio-literary issues of later periods. Readings include the lyric poems of 1910-60, *Requiem*, and *Poem Without a Hero*. Readings in Russian. One course. *Van Tuyl*

Courses Currently Unscheduled

165S. Old Russian Literature. (AL)

207S. Semantics. (SS)

BALTO-FINNIC (BF)

1, 2. Elementary Estonian. (FL) Introduction to understanding, speaking, reading, and writing Estonian. No preliminary knowledge of Estonian necessary. One course each. *Pugh*

3, 4. Elementary Finnish. (FL) Introduction to understanding, speaking, reading, and writing Finnish. No preliminary knowledge of Finnish necessary. One course each. *Pugh*

200. Balto-Finnic Linguistics. (FL) Introduction to Balto-Finnic languages with emphasis on the established literary languages, Finnish and Estonian. Analysis of their phonological and morphological structures. Survey of related nonliterary languages such as Karelian and Vepsian. Taught in English. C-L: Linguistics. One course. *Pugh*

POLISH (POL)

1-2. Elementary Polish. (FL) Introduction to understanding, speaking, reading, and writing Polish. No preliminary knowledge of Polish necessary. Two courses. *Lahusen*

14. Intensive Elementary Polish. (FL) Polish 1 and 2 combined in one semester. Two meetings daily. Required recording-listening practice in the language laboratory. Work on understanding, speaking, reading, and writing. Survey of main elements of grammar. No preliminary knowledge of Polish necessary. Two courses. *Lahusen and staff*

63, 64. Intermediate Polish. (FL) Intensive classroom and laboratory practice in spoken and written patterns. Readings in contemporary literature. Prerequisites: Polish 1 and 2, or consent of instructor. One course each. *Lahusen*

187. Introduction to Polish Literature. (AL) Survey of nineteenth- and twentieth-century Polish literature. Taught in English. C-L: Comparative Area Studies. One course. *Lahusen*

Courses Currently Unscheduled

100. Poland in Transition. (CZ)

174S. Topics in Polish Literature. (AL)

SERBIAN AND CROATIAN (SCR)

1-2. Elementary Serbian and Croatian. (FL) Introduction to understanding, speaking, reading, and writing Serbian and Croatian. No preliminary knowledge of Serbian and Croatian necessary. Two courses. *Andrews*

14. Intensive Elementary Serbian and Croatian. (FL) Serbian and Croatian 1 and 2 combined in one semester. Two meetings daily. Required recording-listening practice in the language laboratory. Work on understanding, speaking, reading, and writing. Survey of main elements of grammar. No preliminary knowledge of Serbian and Croatian necessary. Two courses. *Andrews*

UKRAINIAN (UKR)

1-2. Elementary Ukrainian. (FL) Introduction to understanding, speaking, reading, and writing Ukrainian. No preliminary knowledge of Ukrainian necessary. Two courses. *Dobrenko or Pugh*

14. Intensive Elementary Ukrainian. (FL) Ukrainian 1 and 2 combined in one semester. Two meetings daily. Required recording-listening practice in the language laboratory. Work on understanding, speaking, reading, and writing. Survey of main elements of grammar. No preliminary knowledge of Ukrainian necessary. Two courses. *Dobrenko or Pugh*

187. Introduction to Ukrainian Literature. (AL) Nineteenth- and twentieth-century Ukrainian literature. Taught in English or Russian. C-L: Comparative Area Studies. One course. *Dobrenko*

THE MAJOR

Prerequisites. Russian 1-2 and 63, 64 or equivalent.

Major Requirements. A minimum of eight courses in the department. All majors must take the following courses: Russian 101S, 102S, 195, 196. Each major is required to take one course in nineteenth-century Russian literature and one course in twentieth-century Russian literature. Two areas of specialization are offered. Students contemplating graduate work are strongly encouraged to choose from one of the two following concentrations within the standard major.

Literature Concentration: two other courses to be approved by the department.

Linguistics Concentration: Both 185S and 186S.

Sociology (SOC)

Professor Land, *Chair*; Professor Wilson, *Director of Undergraduate Studies*; Professors K. Cook, DiPrete, Gereffi, Lin, Myers, Simpson, Smith, Spenner, and Tiryakian; Associate Professor O'Rand; Assistant Professors Gao, Jackson, Janoski, Parnell, Thornton, and Zhou; Professors Emeriti Back, Kerckhoff, Maddox, and Preiss; Adjunct Professors Carroll (religion), P. Cook (public policy), George (psychiatry and aging center), Lewin (business), and O'Barr (cultural anthropology); Adjunct Assistant Professors Boychuk (health policy research and education) and Gold (psychiatry and aging center); Adjunct Research Professor Manton (demographic studies); Visiting Professor Gittler

A major is available in this department.

Sociology combines an appreciation of human beings' capacity for self-realization with a scientific understanding of the causes and consequences of their social behavior.

Each course aims to develop both the analytical and critical skills necessary for understanding and evaluating social institutions and social change. Emphasis is upon contemporary research and the use of sociological data in tackling social problems. Active involvement in the learning process is fostered through seminars, independent study, honors work, and internships.

10D. Introduction to Sociology. (SS) Structure and dynamics of groups, organizations, and institutions; social behavior over the life cycle; social control and deviance; population and social ecology; formation and change of societies. Two lectures and one discussion section. One course. *O'Rand or Parnell*

11. Contemporary Social Problems. (SS) A survey of approaches to the study of current social problems and social trends. Sexism, racism, age discrimination; job displacement by technological change; social consequences of environmental pollution; unemployment and poverty; interpersonal problems associated with changes in family structures; maldistribution of health care and educational opportunities; deviance. One course. *Land*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

98. Introduction to Canada. (SS) See C-L: Interdisciplinary Course 98; also C-L: Canadian Studies, Comparative Area Studies, Economics 98, History 98, and Political Science 98. One course. *LeClerc or Thompson*

101B, S. Science and Technology in Twentieth-Century America. (SS) Science and technology as embedded in social and political institutions that constrain and promote their development over time. The complex and dynamic set of relations during the twentieth century across scientific and technological domains (for example, cybernetics, atomic energy, and biotechnology). Particularly controversial events and theories that illustrate these relations. Open only to students in the FOCUS Program. One course. *O'Rand*

101S. Contemporary American Society. (SS) Social trends and problems and their effects on individuals and society. Urbanization; bureaucracy; distribution of wealth, income, and power; status of minorities. One course. *Simpson or Spenner*

103. Sexuality and Culture in America. (SS) See C-L: Cultural Anthropology 103; also C-L: Women's Studies. One course. *Luttrell*

106. Social Psychology. (SS) See C-L: Psychology 116; also C-L: Women's Studies. One course. *Costanzo, Fischer, or George*

110, A-E. Comparative Sociology: Selected Areas. (SS) Comparative studies of selected areas of the world, considering differences and similarities in culture and communication, family, law and social control, urban forms and the organization of work. Areas vary each semester offered and are designated by letter.

A. Africa

B. Asia

C. Europe

D. Latin America

E. Cross-Regional

C-L: Comparative Area Studies. One course. *Gao, Gereffi, Janoski, Lin, Myers, Smith, or Tiryakian*

111. Social Inequality: An International Perspective. (SS) The nature, forms, and socioeconomic bases of inequality. Age, gender, race, ethnicity, class, region, and family as dimensions of inequality. Variations in the structure of inequality over time and across nations. How educational institutions, economic development, work institutions, and state welfare programs affect the shape of inequality. Social inequality and social mobility. C-L: Women's Studies. One course. *DiPrete or O'Rand*

112. American Demographics. (SS) Examination of trends in the fertility, migration, geographic distribution, and composition of the United States population. Consequences for lifestyles, social trends, consumer markets, health care, and public policy. One course. *Land, Myers, or Parnell*

116. Race and Ethnic Relations. (SS) History and changing nature of race and ethnic relations, with special reference to the United States. Sources, forms, and consequences of racial discrimination; movements for racial integration and separatism; the intersection of race, class, and gender. C-L: African and Afro-American Studies 116. One course. *Jackson*

117. Childhood in Social Perspective. (SS) Social forces affecting the place and purpose of children in society, their relations to adults and their treatment by social institutions such as schools and governments. Topics include parent-child relations, sibling relations, child abuse, children's rights, child labor, and the portrayal of children in the mass media. One course. *Simpson*

118. Sex, Gender, and Society. (SS) Nature and acquisition of sex roles. Cross-cultural variations. Developing nature of sex roles in American society. C-L: Comparative Area Studies and Women's Studies. One course. *O'Rand*

119. Juvenile Delinquency. (SS) Environments in which juvenile delinquency develops; delinquent subcultures and peer groups; societal reactions to delinquency in schools, courts, and other agencies. One course. *Land*

Sociology 120, 122, and 123 are designed as a sequence and might optimally be taken in that order, with Sociology 120 being recommended preparation for 122 and 123. However, there are no prerequisites.

120. Causes of Crime. (SS) Definition, types, and extent of crime; biological, psychological, economic, and social causes of criminality; explanation and critical evaluation of theories of crime; structure and patterns of recruitment of criminal organizations; social reactions to crime and the justice system. One course. *Land*

122. Punishment and Treatment of Deviants. (SS) Concepts of punishment and rehabilitation. Programs and facilities for deviants. Structure and operation of "total" institutions, such as prisons and hospitals. Problems of returning to family and community life. One course. *Staff*

123. Social Aspects of Mental Illness. (SS) Theoretical and practical sociological contributions to problems of etiology, definition, law, and treatment; comparisons with other contributions; questions of public policy and programs. One course. *George or Jackson*

124. Human Development. (SS) Especially for sophomores. Juniors and seniors by consent only. See C-L: Interdisciplinary Course 124; also C-L: Human Development and Psychology 124. One course. *Anderson, Gustafson, and staff*

125. Comparative Approaches to Global Issues. (SS) See C-L: Comparative Area Studies 125; also C-L: Cultural Anthropology 125, History 137, Political Science 125, and Religion 121. One course. *Staff*

126. Third World Development. (SS) Theories concerning the role of transnational corporations and international financial institutions (for example, World Bank) in the development of Third World nations, assessed with the aid of sociological and economic data. C-L: Comparative Area Studies. One course. *Gereffi or Parnell*

132. Methods of Social Research. (SS) Principles of social research, design of sociological studies, sampling, and data collection with special attention to survey techniques. One course. *DiPrete or Lin*

133. Statistical Methods. (QR) Elementary statistical techniques and their application to the analysis and interpretation of social science data. Theory of inference is stressed. C-L: Psychology 117. One course. *Land or Spenner*

135. Computers and Society. (SS) The impact of the computer and related technologies on society. Topics include the effects on individual freedom and the nature of work, the implications of high speed information retrieval, and others. One course. *Smith or Spenner*

138. History of Social Thought. (SS) Theories of society and social relations in the writings of Montesquieu, Rousseau, Comte, Marx, Weber, Durkheim, Simmel, Veblen, Sorokin, and others. The history of sociology in relation to philosophical currents, social movements, and transformation of the modern world. One course. *Tiryakian or Wilson*

139. Marxism and Society. (SS) See C-L: Cultural Anthropology 139; also C-L: Comparative Area Studies, Education 139, History 186, Interdisciplinary Course 139, and Literature 139. One course. *Staff*

142. Organizations and Global Competitiveness. (SS) Competition between national economies as understood in the context of social factors such as ethnicity, kinship, gender, education, with a special emphasis on the role of multi-national corporations, public bureaucracies, and small firms. One course. *Gereffi*

143. Management and Labor Relations. (SS) Theories and current research on the interlocking roles of business and labor in the United States and elsewhere. One course. *Gereffi, Janoski, or Thornton*

144. Organizations and Environments. (SS) How organizations (governments, cultures, and technology) are affected by the environment in which they must operate. Competitive strategies (for example, takeovers and mergers); corporate cultures (for example, United States versus Japan); and the impact of technology. One course. *Gao or Thornton*

149. Sexuality and Society. (SS) Sociocultural factors affecting sexual behavior. Changing beliefs about sex; how sexual knowledge is socially learned and sexual identities formed; the relation between power and sex; control over sexual expression. One course. *Tiryakian*

150. The Changing American Family. (SS) Structure, organization, and social psychology of marital, parental, and sibling relations over the life cycle of a family; courtship, marriage, family dissolution in relation to contemporary American society; deviations from and alternatives to the traditional nuclear family. C-L: Women's Studies. One course. *Simpson*

151. Sociology of Religion. (SS) The religious factor in modern society and the social factor in modern religion. Major sociological theories and marginal religious groupings. One course. *Tiryakian or Wilson*

153. Sport and Society. (SS) The effect of sports on people, their self-image, and social roles. Relation of sports as an institution to the family, education, economics, and politics. One course. *Wilson*

154. Art and Literature in Society. (SS) An analysis of the social relations of the world of the arts (painting and sculpture, music, and literature) with emphasis upon creative artists, art publics, art organizations, and artworks as they function in their social-cultural milieux. One course. *Tiryakian*

155. Organizations and Management. (SS) Forms of work organization (corporations, government agencies), the social forces shaping them (management styles, technology, government policy, labor markets), and their effects on employees (productivity,

work satisfaction, turnover). C-L: Women's Studies. One course. *DiPrete, Janoski, Thornton, or Zhou*

156. Global Contexts of Science and Technology. (SS) National variations in the structures of scientific systems, and their consequences for the production and application of scientific knowledge, paying particular attention to how these variations are shaped by national differences in politics, economics, and education. Special focus on recent developments in the biomedical sciences, such as genetic engineering and bioecology. One course. *O'Rand*

157. The Legal Profession and the Law. (SS) Development of the American legal profession, emphasizing the recruitment and training of lawyers, the ways lawyers' work is organized, the role of professional associations, the determinants of success in legal practice, and the influence of legal ethics on practice. One course. *Simpson or Wilson*

158. Markets and Marketing. (SS) Markets as systems of social exchange: how they are organized and developed; their relationship to other social structures such as families, work organizations, and the state; their impact on individuals, careers, consumption patterns, and lifestyles. One course. *DiPrete or Spenner*

159. The Sociology of Entrepreneurship. (SS) The social origins and careers of entrepreneurs. The interrelation of their work and family roles and the distinctiveness of their values and interests. The role of entrepreneurial activity in societal development, and its function in different industries, ethnic groups, and societies. One course. *Thornton*

160. Advertising and Society: Global Perspective. (SS) See C-L: Cultural Anthropology 110; also C-L: English 120, Film and Video, and Women's Studies. One course. *Luttrell, O'Barr, J. Smith, or Wilson*

161. Adulthood and Aging. (SS) Sociological and psychological perspectives on aging, from adolescence through old age and death; demography of human aging; problems caused by increased longevity; policy issues. C-L: Women's Studies. One course. *George, Gold, or O'Rand*

162. Health and Illness in Society. (SS) Relations between patients and health professionals, and utilization of resources for health care. One course. *Lin*

163. Aging and Health. (SS) Illness and health care utilization among the elderly, comparison to other populations, gender and race differences, medicare and medicaid, individual adjustment to aging and illness, social support for sick elderly, the decision to institutionalize, policy debate over euthanasia. One course. *George or Gold*

165. Occupations, Professions, and Careers. (SS) How occupations organize and control labor markets, define services, chart career lines, and develop and sustain occupational identities. C-L: Women's Studies. One course. *O'Rand, Simpson, or Spenner*

167. The Social Bases of Politics. (SS) Theories of and research on political power at the community, national, and international levels. C-L: Canadian Studies and Women's Studies. One course. *Gereffi or Smith*

169. Psychosocial Aspects of Human Development. (SS) See C-L: Psychology 130; also C-L: Human Development and Interdisciplinary Course 180. One course. *Staff*

170. Mass Communication. (SS) An analysis of the role of radio, the press, magazines, movies, and television. An examination of the selective audiences, content characteristics, controlling elements, and organizational structure of the various media. Comparative Canadian material considered where feasible. C-L: Canadian Studies, Comparative Area Studies, and Film and Video. One course. *Smith*

171. Comparative Health Care Systems. (SS) The interaction of historical, political, economic, legal/ethical, and sociological factors in the organization and operation of

health care systems in the United States, the United Kingdom, Sweden, and elsewhere. C-L: Canadian Studies and Comparative Area Studies. One course. *Boychuk*

175. Contemporary Global Issues. (SS) See C-L: Comparative Area Studies 109; also C-L: Cultural Anthropology 109, History 109, and Political Science 160. One course. *Staff*

179. Modern Nationalist Movements. (SS) A comparative sociological study of major nationalist movements. First World nationalism in industrial societies, Third World nationalism in colonial and postcolonial societies, and recent Second World nationalism in socialist societies. C-L: Canadian Studies and Comparative Area Studies. One course. *Tiryakian*

182. Media in Comparative Perspective. (SS) See C-L: Interdisciplinary Course 182; also C-L: Canadian Studies, Comparative Area Studies, Film and Video, and Political Science 180. One course. *Smith*

184S. Canadian Issues. (SS) Prerequisite: Interdisciplinary Course 98 or consent of instructor. See C-L: Interdisciplinary Course 184S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 184S, Economics 184S, History 184S, and Political Science 184S. One course. *Staff*

185S. The Canadian Health Care System. (SS) See C-L: Interdisciplinary Course 185S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 185S, Economics 185S, History 108E, Political Science 185S, and Public Policy Studies 187S. One course. *Boychuk or LeClerc*

190. Markets and Management. (SS) Capstone course for students in the Markets and Management Studies Certificate Program and open only to them. Includes review of major perspectives and concepts from the program's core courses, and production of a major case study research project. One course. *DiPrete, Gereffi, Janoski, O'Rand, Simpson, or Spinner*

193, 194. Independent Study. Consent of instructor required. One course each. *Staff*

195S, 196S, 197S. Seminar in Special Topics. One course each. *Staff*

198. Special Topics in Sociology. Topics vary each semester. One course. *Staff*

For Seniors and Graduates

206. Sociological Theory. (SS) Structure, foundations, and historical antecedents of recent formulations of such theoretical approaches as phenomenological sociology, exchange theory, critical theory, structuralism, neo-Marxist sociology, sociobiology, and action theory. One course. *Tiryakian or Wilson*

207. Social Statistics I: Basic Concepts and Methods. (QR) Review of descriptive statistics; probability concepts; statistical inference, t-tests, and the analysis of variance. Bivariate correlation and regression, dummy variables, multiple regression, and the analysis of covariance. Stress on applications. Statistical computing using SPSS and other programs. One course. *DiPrete or Land*

208. Survey Research Methods. (SS) Theory and application of survey research techniques in the social sciences. Sampling, measurement, questionnaire construction and distribution, pretesting and posttesting, response effects, validity and reliability, scaling of data, data reduction and analysis. Prerequisite: Sociology 207 or the equivalent. One course. *Lin or Smith*

211S, A-E. Proseminars in Sociological Theory. (SS) Development of sociological thought; systematic sociological theory; interrelations with other social and behavioral sciences.

- A. Background of Sociology
 - B. Formal Aspects of Theory
 - C. Sociology of Knowledge
 - D. Evolutionary Theory and Sociobiology
 - E. Special Topics in Sociological Theory
- One course. *Tiryakian or Wilson*

212. Social Statistics II: Linear Models, Path Analysis, and Structural Equation Systems. (QR) Model specification, review of simple regression, the Gauss-Markov theorem, multiple regression in matrix form, ordinary and generalized least squares, residual and influence analysis. Path analysis, recursive and nonrecursive structural equation models; measurement errors and unobserved variables. Application of statistical computing packages. Prerequisite: Sociology 207 or equivalent. One course. *DiPrete or Land*

213. Social Statistics III: Discrete Multivariate Models. (QR) Assumptions, estimation, testing, and parameter interpretation for the log-linear, logit, logistic, and probit models. Model comparisons; applications of statistical computing packages and programs. Prerequisite: Sociology 212 or equivalent. One course. *DiPrete or Land*

214. Comparative and Historical Methods. (SS) Introduction to the theory of comparative research and analysis in the social sciences with special emphasis on comparative methods, quasi-experimental designs, and case studies. C-L: Comparative Area Studies and Political Science 217. One course. *Gereffi, Janoski, Lin, Smith, or Tiryakian*

215. Basic Demographic Methods and Materials. (SS) Population composition, change, and distribution. Methods of standardizing and decomposing rates, life tables and population models, analysis of data from advanced and developing countries. Applications of computer programs for demographic analysis. Prerequisite: Sociology 207 or equivalent. One course. *Myers or Parnell*

217S, A-F. Proseminars in Social Statistics and Research Methods. (SS) Selected topics in the collection and analysis of social science data.

- A. Discrete and Continuous Models of Measurement
 - B. Hazards Models, Event History Analysis, and Panel Data
 - C. Dynamic Models and Time Series Analysis
 - D. Research Design
 - E. Evaluation Research Methods
 - F. Special Topics in Social Statistics and Research Methods
- One course. *DiPrete or Land*

221S, A-D. Proseminars in Aging and Life Course Analysis. (SS) Selected topics in socialization, human development, status attainment and careers, and the sociology of aging.

- A. Social Structure and the Life Course
 - B. Social Patterns of Personal Development
 - C. Social Gerontology
 - D. Special Topics in Aging and Life Course Analysis
- One course. *Jackson, Myers, O'Rand, or Spenner*

222S, A-G. Proseminars in Comparative and Historical Sociology. (SS) Selected topics in the differentiation and transformation of societies.

- A. Theories of Social Change
- B. Globalization and Comparative Development

- C. Societal Transformations and Social Institutions
 - D. Culture, Values, and Ideas
 - E. Social Movements and Political Sociology
 - F. Comparative Social Policies
 - G. Special Topics in Comparative and Historical Sociology
- One course. *Gao, Gereffi, Janoski, Lin, Simpson, Smith, or Tiryakian*

223S, A-E. Proseminars in Crime, Law, and Deviance. (SS) Selected topics in crime and the institutions of social control.

- A. Theories of Crime Causation
 - B. Human Development and Criminal Careers
 - C. Social Control and the Criminal Justice System
 - D. Sociology of Law
 - E. Special Topics in Crime, Law, and Deviance
- One course. *Land, Simpson, or Wilson*

224S, A-F. Proseminars in Population Studies. (SS) Selected topics.

- A. Population Dynamics
 - B. Mortality, Morbidity, and Epidemiology
 - C. Urbanization and Migration
 - D. Demography of the Labor Force
 - E. Demography of Aging
 - F. Special Topics in Population Studies
- One course. *DiPrete, Land, Manton, Myers, O'Rand, Parnell, or Smith*

225S, A-H. Proseminars in Organizations, Markets, and Work. (SS) Selected topics in complex organizations, the labor process, and changing occupations.

- A. Basic Concepts, Theories, and Methods
- B. Organizations and Environments
- C. Social Psychology of Organizations
- D. Markets and Market Systems
- E. Careers and Labor Markets
- F. Sociology of Work and Industrial Relations
- G. Special Topics I: Micro Issues
- H. Special Topics II: Macro Issues

One course. *DiPrete, Gao, Janoski, O'Rand, Spenner, or Thornton*

226S, A-G. Proseminars in Social Institutions and Processes. (SS) Selected topics in the sociology of institutions and social and institutional behavior.

- A. Social Psychology
 - B. Social Stratification
 - C. Political Sociology
 - D. Sociology of Religion
 - E. Sociology of Science
 - F. Sociology of Education
 - G. Special Topics in Social Institutions and Processes
- One course. *Staff*

227S, A-D. Proseminars in Medical Sociology. (SS) Selected topics in medical sociology.

- A. Social Structure and Health
- B. Social Behavior and Health
- C. Organization and Financing of Health Care
- D. Special Topics in Medical Sociology (for example, social epidemiology, stress and coping, health and aging)

One course. *George, Gold, Jackson, Lin, or Thornton*

228S, A-F. Proseminars in Stratification, Mobility, and Labor Force Behavior. (SS) Core and special topics in social stratification, including explanations for the existence, amount, and various dimensions of stratification in society; institutions that produce stratification; forces that cause the structure of stratification to vary both over time and across societies; and structures that govern social mobility within and across generations.

- A. Intergenerational Mobility
 - B. Social Structure and the Life Course
 - C. Social Inequality and the Structure of Poverty
 - D. Careers and Labor Markets
 - E. Societal Transformation
 - F. Special Topics in Stratification and Mobility Research
- One course. *DiPrete, Lin, Spenner, or O'Rand*

234S. Political Economy of Development: Theories of Change in the Third World. (SS) See C-L: Political Science 234S; also C-L: Comparative Area Studies, Cultural Anthropology 234S, History 234S, and Interdisciplinary Course 234S. One course. *Staff*

255. Political Sociology. (SS) Pluralist, elite, and class theories of the relationship between state and society. Topics include: recent debates on the welfare state, social control, political participation, and state-society relations in socialist economies. C-L: Canadian Studies and Political Science 255. One course. *Smith or Tiryakian*

282S. Canada. (SS) See C-L: History 282S; also C-L: Canadian Studies, Comparative Area Studies, Cultural Anthropology 282S, Economics 282S, Interdisciplinary Course 282S, and Political Science 282S. One course. *Staff*

298S, 299S. Seminar in Selected Topics. Substantive, theoretical, or methodological topics. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

- 140. Environment and Society. (SS)**
- 173. Social Conflict and Social Movements. (SS)**
- 188. The Sociology of Contemporary Spain. (SS)**
- 216. Advanced Methods of Demographic Analysis. (SS)**

THE MAJOR

Prerequisite. Sociology 10D or, under exceptional circumstances, an equivalent course (Sociology 11, 49S) with the consent of the director of undergraduate studies.

Major Requirements. Eight courses which must include 132, 133, and 138. Only one independent study credit can be applied to the major; it may not substitute for a required course. A student may complete a second major in sociology. Requirements and advising are the same for the second major as for the first major.

A Handbook for Sociology Majors, available in the office of the director of undergraduate studies, describes areas of concentration, the honors program, and the Sociology Union. It also describes the departmental advising system and the interests of the faculty.

Institute of Statistics and Decision Sciences (STA)

Professor West, *Director*; Associate Professor Burdick, *Director of Undergraduate Studies*; Professors Berry, Sacks, and Winkler; Associate Professors Johnson, Lavine, Reckhow, and Wolpert; Assistant Professors Clyde, Müller, Parmigiani, Stangl, and Vidakovic;

Research Assistant Professor Moore; Adjunct Professor Smith; Visiting Assistant Professor Higdon

The Institute of Statistics and Decision Sciences coordinates teaching and research in statistics and decision theory at Duke. It offers various courses in basic statistics and advanced mathematical statistics. The research emphasis on statistical decision theory in the institute leads to its offering a variety of courses, at various levels, in statistics and decision sciences. There is no undergraduate major in statistics. The institute maintains and runs a Statistical Consulting Center which provides help on statistical problems and projects for members of the Duke community.

10D. Basic Statistics. (QR) Statistical concepts involved in making inferences, decisions, and predictions from data. Emphasis on applications, not formal technique. Not open to students who have had Political Science 138, Psychology 117, Public Policy Studies 112, Sociology 133, or Statistics 110, 112, 113, 114, or 115. One course. *Staff*

104. Probability. (QR) Prerequisite: Mathematics 103. See C-L: Mathematics 135. One course. *Staff*

104S. Probability. (QR) Prerequisite: Mathematics 103. See C-L: Mathematics 135S. One course. *Staff*

110A. Statistics and Data Analysis in the Social Sciences. (QR) Descriptive statistics. Probability and its role in statistical inference. Confidence intervals. Tests of significance. Introduction to linear regression modeling. Not open to students who have had Mathematics 136 or Statistics 110B, 112, 113, 114, 210A, 210B, or 213. One course. *Staff*

110B. Statistics and Data Analysis in Economics. (QR) Descriptive statistics. Probability and its role in statistical inference. Confidence intervals. Tests of significance. Introduction to linear regression modeling. Emphasis on applications in economics. Not open to students who have had Mathematics 136, Statistics 110A, 112, 113, 114, 210A, 210B, or 213. One course. *Staff*

112. Introduction to Applied Statistics. (QR) Classical techniques of testing and estimation. Emphasis on applications of the theory to applied problems. Not open to students who have taken Statistics 213 or equivalent. Prerequisite: Mathematics 32 or equivalent, or consent of instructor. One course. *Staff*

113. Probability and Statistics in Engineering. (QR) Introduction to probability, independence, conditional independence, and Bayes' theorem. Discrete and continuous, univariate and multivariate distributions. Linear and nonlinear transformations of random variables. Classical and Bayesian inference, decision theory, and comparison of hypotheses. Experimental design, statistical quality control, and other applications in engineering. Not open to students who have taken Statistics 112 or 213. Prerequisite: Mathematics 103 or equivalent. One course. *Staff*

114. Statistics. (QR) Prerequisites: Mathematics 104 and 135. See C-L: Mathematics 136. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Consent of instructor and director of undergraduate studies required. One course each. *Staff*

205. Probability and Measure Theory. (QR) Introduction to probability spaces, the theory of measure and integration, random variables, and limit theorems. Distribution functions, densities, and characteristic functions; convergence of random variables and of their distributions; uniform integrability and the Lebesgue convergence theorems. Weak and strong laws of large numbers, central limit theorem. Prerequisites: elementary real analysis and elementary probability theory. One course. *Wolpert*

207. Probability. (QR) Prerequisite: Mathematics 281 or equivalent. See C-L: Mathematics 290. One course. *Staff*

210A. Statistics and Data Analysis for Policymakers. (QR) Elements of statistical inference and estimation including exploratory data analysis, regression, and analysis of variance. Emphasis on public policy applications. Not open to students who have had Mathematics 136 or Statistics 110A, 110B, 112, 113, 114, 210B, or 213. C-L: Public Policy Studies 222. One course. *Stangl*

210B. Statistics and Data Analysis in Biological Science. (QR) Elements of statistical inference and estimation including exploratory data analysis, regression, and analysis of variance. Emphasis on biological science applications. Not open to students who have had Mathematics 136 or Statistics 110A, 110B, 112, 113, 114, 210A, or 213. C-L: Environment 251. One course. *Staff*

213. Introduction to Statistical Methods. (QR) Emphasis on classical techniques of hypothesis testing and point and interval estimation, using the binomial, normal, t, F, and chi square distributions. Not open to students who have had Statistics 114 or Mathematics 136. Prerequisite: Mathematics 103 (may be taken concurrently) or equivalent, or consent of instructor. One course. *Staff*

214. Probability and Statistical Models. (QR) An introduction to applied probability and to the parametric probability models commonly used in statistical analysis. The generation of random variables with specified distributions, and their use in simulation. Mixture models; linear regression models; random walks, Markov chains, and stationary and ARMA process; networks and queueing models. Prerequisites: Mathematics 103 and 104 or consent of instructor. One course. *Staff*

215. Statistical Inference. (QR) Classical, likelihood, and Bayesian approaches to statistical inference. Foundations of point and interval estimation, and properties of estimators (bias, consistency, efficiency, sufficiency, robustness). Testing: Type I and II errors, power, likelihood ratios; Bayes factors, posterior probabilities of hypotheses. The predictivist perspective. Applications include estimation and testing in normal models, exponential families, regression and one-way ANOVA, contingency tables. Hierarchical normal models; model choice and criticism. Prerequisite: Statistics 213 or co-registration in Statistics 214 or consent of instructor. One course. *Staff*

216. Generalized Linear Models. (QR) Likelihood-based inference in generalized linear models (GLIMs). Multiple linear regression, theory, and practice. Elements of Bayesian analyses of linear models. Theory of likelihood-based inference for GLIMs. Factor variables and cross-classified data arrays. Discrete models: binary regressions and simple contingency tables. Introduction to log-linear models. Data analysis: model fitting, model choice, and residuals-based diagnostics. Prerequisites: Statistics 214 and coregistration in Statistics 215 or equivalent. One course. *Staff*

226. Statistical Decision Theory. (QR) Formulation of decision problems; criteria for optimality: maximum expected utility and minimax. Axiomatic foundations of expected utility; coherence and the axioms of probability (the Dutch Book theorem). Elicitation of probabilities and utilities. The value of information. Estimation and hypothesis testing as decision problems: risk, sufficiency, completeness and admissibility. Stein estimation. Bayes decision functions and their properties. Minimax analysis and improper priors. Decision theoretic Bayesian experimental design. Combining evidence and group decisions. Prerequisite: Statistics 215 or consent of instructor. One course. *Staff*

242. Applied Regression Analysis. (QR) Linear regression using both graphical and numerical methods. Model construction, critique, and correction using graphical residual analysis. One-way and two-way analysis of variance; introduction to design of

experiments. Use of a standard statistical software package. Applications and examples drawn from various sources, emphasizing the biological and environmental sciences. Prerequisite: Statistics 210B or equivalent. C-L: Environment 255. One course. *Staff*

244. Linear Models. (QR) Multiple linear regression. Estimation and prediction. Likelihood, Bayesian, and geometric methods. Analysis of variance and covariance. Residual analysis and diagnostics. Model building, selection, and validation. Prerequisites: Mathematics 104 and Statistics 113 or 210. C-L: Mathematics 241. One course. *Staff*

245. Introduction to Multivariate Statistics. (QR) Multinormal distributions, multivariate general linear model, Hotelling's T^2 statistic, Roy union-intersection principle, principal components, canonical analysis, factor analysis. Prerequisite: Statistics 244 or equivalent. C-L: Mathematics 242. One course. *Burdick*

246. Experimental Design. (QR) Randomization, blocks, factors, and treatments; random and fixed effects; fractional factorial, Latin squares, and other designs; estimation and testing; optimal design and allocation; informational design. Prerequisites: Statistics 213 and 244 or equivalent. One course. *Staff*

253. Applied Stochastic Processes. (QR) Prerequisite: Mathematics 135 or equivalent. See C-L: Mathematics 240. One course. *Staff*

273. Numerical Analysis. (QR) Prerequisites: knowledge of an algorithmic programming language, intermediate calculus including some differential equations, and Mathematics 104. See C-L: Computer Science 250; also C-L: Mathematics 221. One course. *Greenside or Rose*

282. Optimization Methods. (QR) Optimization techniques useful in decision making. Numerical techniques for nonlinear optimization, with and without constraints; linear and quadratic programming; applications. Other topics, including dynamic programming, optimal control, and stochastic methods, as time permits. Prerequisites: Mathematics 32 and 104 or equivalent, or consent of instructor; knowledge of a computer programming language is helpful but not required. One course. *Wolpert*

290. Statistical Laboratory. (QR) Introduction to statistical thinking, data management and collection, sampling and design, exploratory data analysis, graphical and tabular displays, summarizing data. Introduction to applied work. Computer orientation, statistical packages and operating systems, especially unix on high-speed workstations, and the statistical package S-Plus. Graphics and numerical computing. Examples from various disciplines. One course. *Staff*

293. Special Topics in Statistics. (QR) Advanced topics of current interest. Prerequisite: Statistics 213 or consent of instructor. One course. *Staff*

294. Special Topics in Statistics. (QR) Prerequisite: Statistics 213 or consent of instructor. One course. *Staff*

297. Topics in Probability Theory. Prerequisite: Mathematics 290 or consent of instructor. See C-L: Mathematics 293. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

30. Introduction to Decision Analysis. (QR)

31. Applied Game Theory. (QR)

115. Statistical Data Analysis in Engineering. (QR)

203S. Senior Seminar in Statistics. (QR)

298. Topics in Probability Theory

Swahili

For courses in Swahili, see Asian and African Languages and Literature.

University Writing Program

Professor of the Practice Gopen, *Director*; Assistant Professor of the Practice Hillard, *Assistant Director*; Assistant Professor of the Practice Brett

The writing requirement may be fulfilled by successfully completing University Writing Course 4, 5, 6, 7, or 8, each of which involves expository composition and regular individual conferences. The requirement must be fulfilled in a student's first semester of residence at Duke. Despite the distinction in course titles, all these courses deal with the same core concerns and have the same objective: they are intended to help students of all abilities to a greater understanding of the language and thereby to a greater control of their thinking process.

The University Writing Program also coordinates a series of courses offered in several departments in which writing is a key component of learning. In 1995 these include the 20S-series courses in English, history, literature, and religion.

4. Workshop in Rhetoric (4). A collaborative workshop that attends to the complexities of the communication process between writers and readers. Designed for those who feel less confident than they would like about their writing. One course. *Staff*

5. Workshop in Rhetoric (5). Like University Writing Course 4, this course is a collaborative workshop that attends to the complexities of the communication process between writers and readers. Designed for those who feel relatively confident about their writing. One course. *Staff*

7. Workshop in Rhetoric (7): The FOCUS Program. A collaborative workshop that attends to the complexities of the communication process between writers and readers. Designed to coordinate with the subject matter of the various FOCUS Programs. One course. *Staff*

8. Workshop in Rhetoric (8). This course, which covers the rhetorical principles available in University Writing Course 4, 5, 6, and 7, is offered only in the spring. Not open to students who have passed 4, 5, 6, or 7. One course. *Staff*

12. Intermediate Composition. For transfer students and continuing education students only. The approach to evaluating written language that is taught in the University Writing Program. Not open to students who have taken University Writing Course 4, 5, 6, 7, or 8. One course. *Staff*

112. Scientific Writing. Advanced composition for those who will be choosing careers in science. Techniques for presenting complicated data and complex thought in clear and persuasive prose. Readings in the history, philosophy, or theory of science. Weekly writing tasks. Prerequisite: University Writing Course 4, 5, 6, or 7. C-L: English 116A. One course. *Staff*

117S. Advanced Composition I. Emphasis on the connections between substance and structure; revision techniques and inventional procedures. Tailored to the level, needs, and interests of students who enroll. Prerequisite: previous University Writing Course or consent of the director of the University Writing Program. C-L: English 117A. One course. *Staff*

118S. Advanced Composition II. Emphasis on preparing prose for publication, in whatever fields interest the participating students. Prerequisite: successful completion of University Writing Course 117S. C-L: English 117B. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

3. Introductory Composition and Rhetoric

6. Interpretive Writing

For other courses in writing, see listings for Department of English.

Women's Studies Program (WST)

Professor of the Practice and Adjunct Professor J. O'Barr, *Director*; Professor Hamilton; Assistant Professor of the Practice Rudy

A major or a certificate is available in this program.

The program in women's studies provides for students an understanding of the forces that shape the position of women and men in society and develops an appreciation for knowledge about gender. Women's studies brings together faculty and students from across the university who are encouraged to question and reinterpret existing bodies of knowledge and to include women's perspectives and contributions in this critical approach.

The courses listed below are offered by the Women's Studies Program (WST) or are cross-listed with other academic departments and programs. Both are used to fulfill the requirements for the major or certificate. For a more detailed description of each course, consult the Women's Studies Program Office or the appropriate department or program office.

REGULARLY SCHEDULED COURSES IN WOMEN'S STUDIES

Women's Studies Courses (WST)

103. An Introduction to Women's Studies. (SS) A course about women, gender, and feminist theories in the United States, using a variety of disciplinary approaches to analyze women's experiences, the women's movement, and women's studies. One course. *J. O'Barr and staff*

150. Selected Topics in Women's Studies. Topics vary, focusing on interdisciplinary work arising from feminist scholarship. One course. *Staff*

150S. Selected Topics in Women's Studies. Seminar version of Women's Studies 150. One course. *Staff*

191, 192. Independent Study. Consent of instructor and program director required. One course each. *Staff*

191A, 192A. Independent Study. Consent of instructor and program director required. One and one-half courses each. *Staff*

195S. Senior Seminar in Women's Studies. Original research project in feminist scholarship, applying multidisciplinary perspectives. For Women's Studies Program majors and certificate earners. Consent of instructor required. One course. *Staff*

Departmental Courses

Art 186/Literature 149. *Feminism in Twentieth-Century Art. Stiles*
Asian and African Languages and Literature 173. *Women in Arab Literature. Cooke*
Asian and African Languages and Literature 190. *Women in Islam. Cooke*
Classical Studies 104S. *Women in the Ancient World. Boatwright*
Classical Studies 195S, 196S. *Sex Roles in Antiquity. Boatwright*
Cultural Anthropology 103. *Sexuality and Culture in America. Luttrell*
Cultural Anthropology 113. *Gender and Culture. Silberblatt*
Cultural Anthropology 115S. *Anthropology of Gender: Special Topics. Allison, Luttrell, Quinn, Silberblatt, or Starn*
Cultural Anthropology 142. *Sexuality in Global Perspective. Luttrell*

Cultural Anthropology 215S. The Anthropology of Gender: Theoretical Issues. *Allison, Luttrell, Quinn, Silverblatt, or Starn*
 Cultural Anthropology 216S. Gender, Race, and Class. *Luttrell*
 Drama 125S. Twentieth-Century Women Playwrights. *McAuliffe*
 English 109S. Topics in Women's Poetry. *Pope*
 English 131. Margaret Atwood. *A. Davidson*
 English 169S. Twentieth-Century Popular American Women's Writing. *Tompkins*
 English 170. Writings by Women of Color. *Willis*
 English 179S. Studies in Women's Fiction. *Pope*
 English 269. American Women Writers. *C. Davidson, Pope, or Tompkins*
 French 104S. Women in Contemporary France. *Orr*
 French 108S. French Women: Myths, Realities, and the Law. *Staff*
 French 157. Difference and Representation. *Schor*
 French 159. Feminist Fiction. *Orr*
 French 290S. Studies in a Contemporary Figure. *Orr*
 German 124S. Contemporary German Women Writers. *Rasmussen*
 German 254S. Literature by Women. *Rasmussen*
 German 275S. German Women Writers. *Rasmussen*
 History 169A, 169B. The Social History of American Women. *Hewitt*
 History 171A. History of Women in Early Modern Europe. *Neuschel*
 History 171B. History of Women in Modern Europe. *Koonz*
 History 190. The History of Women in Science and Medicine. *Green*
 History 195S.36. Women, Family, and the State. *Y. Miller*
 History 195S.41. Women in Medieval Society. *Green*
 History 195S.50. History of Feminism in the U.S. *Hewitt*
 History 195S.66. Sex, Class, and Race in America. *Hewitt*
 Italian 105. Italian Women Writers. *Finucci*
 Literature 136. Autobiography across Cultures. *Kaplan or Willis*
 Literature 151. Special Topics in Women Writers of the World. *Staff*
 Literature 254. Introduction to Feminism. *Moi or Radway*
 Music 120S. Women in Music. *Staff*
 Philosophy 122. Philosophical Issues in Feminism. *Lind*
 Philosophy 203S. Contemporary Ethical Theories. *Lind*
 Political Science 140. Feminist Political Theory. *Curtis*
 Psychology 106. Psychology of Women. *Hamilton or Roth*
 Psychology 180S. Advanced Topics in the Psychology of Gender. *Fischer, Fredrickson, Hamilton, or Roth*
 Psychology 264S. Gender, Hormones, and Health. *Hamilton*
 Religion 109. Women in the Biblical Tradition: Image and Role. *C. Meyers*
 Religion 125. Women and Sexuality in the Christian Tradition. *Clark*
 Religion 253. Feminist Theory and the Study of Christianity. *Clark and McClintock-Fulkerson*
 Russian 169/269. Women and Russian Literature. *Gheith*
 Russian 214. Gender, Nationalities, and Russian Literary Tradition. *Gheith*
 Sociology 118. Sex, Gender, and Society. *O'Rand*
 Sociology 149. Sexuality and Society. *Staff*
 Spanish 141S. Spanish-American Women Writers. *Staff*

Recommended Course Offerings

The courses below are taught by affiliated faculty and are recommended by the Women's Studies Program as complementary and relevant. With a program advisor's permission, up to two of these courses may be used to fulfill requirements for the major and one course may be used to fulfill the requirements for the certificate.

Art 167. Twentieth-Century Art, 1900-1945. *Stiles*
 Art 168. Art since 1945: Modernism and Postmodernism. *Stiles*
 Art 179. History of Event Art. *Stiles*
 Art 187. Surrealism. *Stiles*
 Cultural Anthropology 110. Advertising and Society: Global Perspectives. *Luttrell or W. O'Barr*
 Economics 208S. Economics of the Family. *McElroy*
 English 139S. Politics of Gender. *DeNeef*
 English 154. American Literature: 1915-1960. *Pope*
 English 156. American Popular Culture. *Radway or Willis*
 English 163. Twentieth-Century American Poetry. *Pope*
 English 179S. Repairing the Continent. *A. Davidson*
 English 187. Melodrama and Soap Opera. *Gaines*
 English 189S. Sexualities in Film and Literature. *Gaines*

English 288. The Western in American Culture. *Tompkins*
 French 166, 167. Contemporary French Life and Thought. *Kaplan*
 History 107A, 107B. Social and Cultural History of England. *Herrup or Thorne*
 History 115. History of Africa. *Ewald*
 History 117. Early Modern Europe. *Neuschel*
 History 160. The United States from the New Deal to the Present. *Chafe*
 History 227-228. Recent United States History: Major Political and Social Movements. *Chafe*
 Literature 177. Film Theory. *Gaines*
 Literature 185. Psychoanalysis, Literature, and Film. *Gaines*
 Political Science 187S. Politics and the Libido. *Paletz*
 Psychology 208S. Emotion. *Fredrickson*
 Psychology 217S. Advanced Social Psychology. *Costanzo, Fischer, or Fredrickson*
 Religion 40. Judaism. *Bland and staff*
 Religion 234. Early Christian Asceticism. *Clark*
 Sociology 106. Social Psychology. *Fischer or George*
 Sociology 111. Social Inequality: An International Perspective. *O'Rand*
 Sociology 150. The Changing American Family. *Kerckhoff or Simpson*
 Sociology 161. Adulthood and Aging. *George, Gold, or O'Rand*
 Sociology 163. Aging and Health. *George or Gold*
 Sociology 165. Occupations, Professions, and Careers. *Simpson or Spinner*
 Spanish 166. Nineteenth-Century Prose Fiction. *Sieburth*

House Courses. The Women's Studies Program regularly sponsors house courses on topics of interest to students in the program. While house courses do not officially count toward the major or the certificate, students are strongly encouraged to consider them as valuable supplements to full-credit courses. Lists of the house courses being offered are available in the program office at the beginning of each semester.

THE MAJOR

To major in women's studies, a student must take a minimum of eight courses. Introduction to Women's Studies (WST 103) and a senior seminar (WST 195S) or their equivalents are required for the major. At least six of these courses must come from courses listed in women's studies either designated as WST or cross-listed with other departments. Up to two courses may be in the following forms: (1) courses from the Recommended Course Offerings list, (2) independent studies, or (3) one-time course offerings not appearing on regular lists, but which are complementary and relevant to a student's course of study. Such courses must be approved by a program advisor in order to be credited toward the major.

As an interdisciplinary major, the women's studies major is organized around a set of guidelines rather than a sequence of required courses. The guidelines are designed to facilitate three distinct yet overlapping levels of inquiry into women's experiences and gender analysis: *critique, comparison, and connection*. Within the requirements for the major, a student has a great deal of flexibility in designing the substantive focus of the major. To fulfill the major, students must take at least two courses that focus on critique, two that are primarily comparative in nature, and two that emphasize connection. Additional courses may fall under any of these guidelines.

Acquiring *critical* perspectives is a process involving three steps. The first is to produce new knowledge. In the light of that new knowledge, the second step is to modify the frameworks of knowledge that already exist. The third step is to correct assumptions and biases that prove to be incorrect in the light of this more complete knowledge. Critical perspectives are honed in the women's studies major through courses which emphasize the historical omissions, factual errors, and misrepresentations of women's experiences.

Comparative perspectives are pursued in at least two ways: within and across disciplines and within and across cultures. By comparing how feminist analysis operates in two or more disciplines, students will be able to identify and analyze the ways in which the methods of academic inquiry differ by discipline and what makes an analysis feminist. By comparing cultural contexts, students will be able to identify and analyze women's and men's diverse experiences.

The emphasis on *connections* is one of the distinguishing features of the women's studies major. Students are continually encouraged to make connections between ideas and experiences, between past knowledge and future possibilities, between cultural and policy issues and personal decisions, and between women's studies and other academic study. These connections are fostered in senior seminars and independent studies, and through internships or other supervised practice, among other possibilities.

Individual courses will often fulfill more than one of these guidelines. Students will be expected to articulate the ways in which an individual course and particular configurations of courses have facilitated their pursuit of critique, comparison, and connection. Students are thus responsible for designing their own major in close consultation with program advisors. This allows students to explore the topics which most interest them; the flexible nature of the curricular requirements also enables students to take advantage of the one-time course offerings and visiting scholars in constructing personalized programs.

In planning the major, each student works with a faculty advisor to accomplish three goals. The first is to develop a coherent plan of study through which the student pursues a theme or concentration within coursework; that theme or concentration may emphasize breadth or depth in subject matter. The second is to insure that a student balances introductory and advanced courses as they are available from other departments. The third is to fulfill the three guidelines of critique, comparison, and connection described above.

Students may complete a first or second major in women's studies, or they may choose to pursue their interests in women's studies in the form of a certificate.

THE CERTIFICATE

The requirements for the certificate reflect the ideas shaping the major. A student must complete five courses, including Women's Studies 103, Introduction to Women's Studies, or its equivalent. At least four of these courses must come from courses listed in women's studies. At least one course must be a 100-level seminar. Following the same three guidelines of critique, comparison, and connection, students must take at least one course that focuses on critique, one course that is comparative in nature, and one course that emphasizes connections.

ADVISING

Each year, several faculty affiliated with the women's studies program serve as advisors for students majoring in women's studies. Majors are paired with faculty advisors on the basis of students' general areas of interest. Students majoring in women's studies are encouraged to seek out and work with any of the women's studies faculty in addition to their primary faculty advisor.

HONORS/DISTINCTION

Qualified students earning an undergraduate certificate or major may be eligible for graduation with distinction in women's studies. More detailed guidelines are available in the program office. Students interested in being considered for honors/distinction should contact the program office no later than the spring of their junior year.

In addition to offering courses, and a major and certificate representing a focus in women's studies, the program sponsors lectures, films, discussions, conferences, internships, and work-study opportunities. Additional information on courses, the women's studies major or certificate, and other opportunities in women's studies is available at the Women's Studies Program Office, 210 East Duke Building.

Writing

See University Writing Program.

Zoology (ZOO)

Professor H. Nijhout, *Chair*; Professors Barber, Brandon, Forward, Gillham, Klopfer, Laurie, Livingstone, McClay, Nicklas, Rausher, Simons, Staddon, Terborgh, Tucker, Uyenoyama, Vogel, Wainwright, and Ward; Associate Professors Nowicki, Rittschof, Roth, K. Smith, and Van Schaik; Assistant Professors Crenshaw, Cunningham, Fehon, and Morris; Professors Emeriti Bailey, Bookhout, Costlow, Fluke, Gregg, and Schmidt-Nielsen; Assistant Professors of the Practice Mercer and Motten; Research Assistant Professor Roach; Adjunct Professor Schmidt-Koenig; Adjunct Associate Professor M. Nijhout

See Biology for a description of the major and the list of courses taught by the zoology faculty.

School of Engineering

Professor Dowell, *Dean*; Professor Shepard, *Associate Dean*

ENGINEERING

(INTERDEPARTMENTAL) (EGR)

24L. Introduction to Environmental Engineering. Materials and energy balances applied to environmental engineering problems. Water pollution control, applied ecology, air quality management, solid and hazardous waste control. Environmental ethics. (1.0 ES) Prerequisite: Chemistry 11L. One course. *Vesilind*

25L. Introduction to Structural Engineering. An introduction to engineering and the engineering method through a wide variety of historical and modern case studies, ranging from unique structures like bridges to mass produced objects like pencils. (.5 ED/.5 ES) One course. *Petroski*

49S. First-Year Seminar. Topics vary each semester offered. One course. *Staff*

50. Introduction to Numerical Computing. Introduction to the use of computers in the solution of engineering and scientific problems. Systematic methods for algorithm development and coding in a higher-level computer language. Application of selected numerical methods. Not open to students who have matriculated at Duke. One course. *Staff*

53L. Computational Methods in Engineering. Introduction to computer methods and algorithms for analysis and solution of engineering problems using numerical methods in a workstation environment. Topics include; numerical integration, roots of equations, simultaneous equation solving, finite difference methods, matrix analysis, linear programming, dynamic programming, and heuristic solutions used in engineering practice. This course includes instruction in the programming language FORTRAN and does not require any prior knowledge of computer programming. (1.0 ES) One course. *Staff*

75L. Mechanics of Solids. Analysis of force systems and their equilibria as applied to engineering systems. Stresses and strains in deformable bodies; mechanical behavior of materials; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. (1.0 ES) Prerequisites: Mathematics 32 and Physics 51L. One course. *Hueckel, Laursen, B. Utku, or J. F. Wilson*

83L. Structure and Properties of Solids. Introduction to materials science and engineering, emphasizing the relationships between the structure of a solid and its properties. Atomic and molecular origins of electrical, mechanical, and chemical behavior are treated in some detail for metals, alloys, polymers, ceramics, glasses, and

composite materials. (.25 ED / .75 ES) Prerequisites: Chemistry 11L and Mathematics 31 or 33. One course. *Cocks, Eom, Gösele, Jones, Needham, Shepard, or Tan*

115. Engineering Systems Optimization. Introduction to mathematical optimization, engineering economic analysis, and other decision analysis tools used to evaluate and design engineering systems. Application of linear and nonlinear programming, dynamic programming, expert systems, simulation and heuristic methods to engineering systems design problems. Applications discussed include: production plant scheduling, water resources planning, design and analysis, vehicle routing, resource allocation, repair and rehabilitation scheduling and economic analysis of engineering design alternatives. (.5 ED / .5 ES) Corequisite: Mathematics 111. One course. *Jacobs or Pas*

123L. Dynamics. Principles of dynamics of particles, rigid bodies, and selected nonrigid systems with emphasis on engineering applications. Kinematic and kinetic analysis of structural and machine elements in a plane and in space using graphical, computer, and analytical vector techniques. Absolute and relative motion analysis. Work-energy; impact and impulse-momentum. Laboratory experiments. (1.0 ES) Prerequisites: Engineering 75L and Mathematics 103 or consent of instructor. One course. *Petroski, Virgin, or J. F. Wilson*

150L. Engineering Communication. Principles of written and verbal technical communication; graphics, mapping, surveying and engineering drawing. Computer graphics, two- and three-dimensional transformations, hidden-surface and hidden-line algorithms, and computer aided design. (1.0 ES) Prerequisite: Engineering 53L or equivalent. One course. *Pas and Vesilind*

165. Special Topics in Engineering. Study arranged on special engineering topics in which the faculty have particular interest and competence as a result of research or professional activities. Consent of instructor(s) required. Quarter course, half course, or one course. Variable credit. *Staff*

174. Technology Assessment and Social Choice. Societal, economic, environmental, psychological, and ethical considerations in the design and application of technological systems; techniques for technological forecasting and assessment; citizen participation in policy-making; recent case studies; interdisciplinary team project. C-L: Religion 174. One course. *Garg and McCollough*

175. Aesthetics, Design, and Culture. An examination of the role of aesthetics, both as a goal and as a tool, in a culture which is increasingly dependent on technology. Visual thinking, perceptual awareness, experiential learning, conceptual modeling, and design will be explored in terms of changes in sensory environment. Design problems will be formulated and analyzed through individual and group design projects. (.5 ED) One course. *Pearsall*

183, 184. Projects in Engineering. Courses in which engineering projects of an interdisciplinary nature are undertaken. The projects must have engineering relevance in the sense of undertaking to meet human need through a disciplined approach under the guidance of a member of the engineering faculty. Consent of instructor required. One course each. *Staff*

221. Computational Linear Algebra. Linear vector spaces of real and complex n-tuples, norms, metrics, inner-products, basis vectors, rank and dimensionality; matrices as linear maps, rank and nullity; particular and general solutions of $Ax=b$; factorization of matrices by successive transformations; solution of $Ax=b$ by direct and iterative methods; special and general eigenvalue problems; diagonalization and tridiagonalization by similarity transformations; power methods; and computational complexities, storage requirements, convergence characteristics, error propagation, and the mathe-

mathematical basis of the studied algorithms. (1.0 ES) Prerequisites: Mathematics 111 or equivalent, and knowledge of any algorithmic programming language. One course. S. Utku

COURSES CURRENTLY UNSCHEDULED

23. Principles and Practices in Engineering Economics

135. Continuum Mechanics

151. Computer Simulations in Engineering

170. Forecasting Techniques

172A. Contemporary Science: Issues and Challenges

172B. Contemporary Technology: Issues and Challenges

187. History of Nuclear Energy: Civilian Applications

188. History of Nuclear Energy: Military Applications

222. Computer Solutions of Ordinary and Partial Differential Equations

Biomedical Engineering (BME)

Professor McElhaney, *Chair*; Professor S. Smith, *Director of Undergraduate Studies*; Professors Barr, Clark, Hammond, Hochmuth, Jaszczak, Katz, Lieberman, Nolte, Plonsey, Strohbehn, Van Trigt, von Ramm, and Wolbarsht; Associate Professors Burdick, Feagin, Floyd, Glower, Massoud, Needham, Reichert, P. K. Smith, Trahey, and Truskey; Assistant Professors Clegg, Guilak, Henriquez, Krassowska, Myers, Setton, and Wolf; Research Professor Thurstone; Associate Research Professor Pasipoularides; Assistant Research Professors Black, Bohs, Cusma, Hales, Nightingale, Rasmusson, M. Smith, and Stetten; Adjunct Professor Ideker; Adjunct Associate Professor Cooper

A major is available in this department.

Biomedical engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modeling and simulation of physiological systems through development of medical instrumentation and experimental research to solutions of practical clinical problems. The undergraduate program in biomedical engineering is flexible and can satisfy the requirements for entrance into graduate work in engineering, medicine, and other professional schools or science disciplines.

Opportunities for student research are available in the biomedical engineering laboratories. The department utilizes digital computers extensively, and computer science techniques are applied in acquiring, processing, and modeling biological data. Research in the biomedical materials laboratory is directed toward the development of materials suitable for use in biological environments such as the vascular system. Biomedical engineering in cardiology involves study of the electrical activity of the heart and heart tissues in animals and humans, to increase the basic knowledge of their normal and abnormal behavior. Other electrophysiological systems are examined through the application of models and simulation techniques. The ultrasound imaging laboratories are employed for research and instruction in the biomedical application of this important technique. Ultrasound instrumentation measures and images biological tissue structures, and the laboratories are equipped with a variety of advanced ultrasonic imaging instruments. A transducer fabrication facility, test equipment for the design and construction of advanced ultrasound systems, a dedicated VAX 4300 computer and a DECstation 3100 for image processing, and extensive video recording and display facilities are available. Other areas of research and instruction include biosensors and

vascular implants. The biomechanics laboratory is equipped to measure biomechanical responses of tissues and organs and gait parameters, and to test protective headgear and develop new prosthetic devices.

Additional opportunities are available in biological fluid mechanics, lipid transport mechanisms, and biosensors.

7. Membranes. An introduction to the elementary properties of membranes, both electrical and mechanical from a mathematical perspective, with some computer exercises. (.5 ED/ .5 ES) Prerequisite: limited to freshmen who are prospective biomedical engineering majors. One course. *Barr*

83L. Introduction to Biomaterials. The principles of materials science and engineering with particular attention to topics most relevant to biomedical engineering. The structure-property relationships of metals, ceramics, polymers, and composites as well as skin, bone, cartilage, ligament, and vasculature; extensive treatment of the properties unique to materials' surfaces. Behavior of materials in the physiological environment. Fall only. (.25 ED/ .75 ES) Prerequisites: Chemistry 11L and 12L; corequisite: Physics 51L. One course. *Reichert*

101L. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. (.25 ED/ .75 ES) Prerequisites: Biomedical Engineering 163L or Electrical Engineering 62L, and Mathematics 111. One course. *Barr, Henriquez, or Krassowska*

106. Mass and Energy Balances in Chemical and Biological Systems. Engineering problems involving material and energy balances taken from chemical and biochemical process industries and mammalian physiology. Batch and continuous reactive systems in the steady and unsteady state. Humidification processes. Metabolism. (.5 ED/ .5 ES) Not open to students who have taken Biomedical Engineering 145 or Mechanical Engineering 101L. Prerequisite: Chemistry 12L. One course. *Clark*

110L. Introductory Biomechanics. Static and dynamic analysis of biological systems; analysis of gait and locomotion; ballistocardiography; biomechanical aspects of various sport activities, diving, and jumping; power, work, and energy concepts applied to the human body; strength and properties of tissue; and injury mechanisms and tolerance. (.25 ED/ .75 ES) Prerequisites: Mathematics 32 and Physics 51L. One course. *McElhaney, Myers, or Nightingale*

145. Chemical Thermodynamics. Thermodynamic properties and thermodynamic state. Exchange of heat and work in quasi-equilibrium processes. Chemical and phase equilibria of multicomponent mixtures. (.25 ED/ .75 ES) Prerequisite: junior standing. One course. *Setton or Truskey*

163L, 164L. Biomedical Electronics and Measurements. A study of the basic principles of biomedical electronics and measurements with emphasis on the operational performance and selection of transducers, instruments, and systems for biomedical data acquisition and processing. Selected laboratory work emphasizes the measurements of specific physiological events. (.5 ED/ .5 ES each) Prerequisite: Electrical Engineering 61L. One course each. *S. Smith, Trahey, von Ramm, or Wolf*

171. Signals and Systems. Convolution, deconvolution, Fourier series, Fourier transform, sampling, and the Laplace transform. Continuous and discrete formulations with emphasis on computational and simulation aspects and selected biomedical examples. (1.0 ES) One course. *Krassowska*

191, 192. Projects in Biomedical Engineering. For juniors or seniors who express a desire for such work and who have shown aptitude for research in one area of biomedical engineering. Half course to two courses. (.5 ED/ .5 ES) Variable credit. *Staff*

193, 194, 195. Projects in Cardiovascular Biomedical Engineering. Projects in emerging cardiovascular technologies. Primarily for Engineering Research Center fellows who express a desire for and who have shown aptitude for research in emerging cardiovascular technologies. Consent of instructor required. (.5 ED/ .5 ES) One course each. *Staff*

201L. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Students choose a relevant topic area for detailed study and report. Not open to students who have taken Biomedical Engineering 101L or equivalent. 3 units; 4 units with laboratory. (.25 ED/ .75 ES) One course. *Barr or Henriquez*

204. Measurement and Control of Cardiac Electrical Events. Design of biomedical devices for cardiac application based on a review of theoretical and experimental results from cardiac electrophysiology. Evaluation of the underlying cardiac events using computer simulations. Examination of electrodes, amplifiers, pacemakers, and related computer apparatus. Construction of selected examples. Prerequisites: Biomedical Engineering 101L and 163L or equivalents. One course. *Wolf*

205L. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects, including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and correct faults, and final design evaluation. Evaluation includes examination of complexity, reliability, and cost. Design and construction oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. (.75 ED/ .25 ES) Prerequisites: Biomedical Engineering 163L, 164L and Engineering 53L or equivalents. One course. *Hammond*

207. Transport Phenomena in Biological Systems. An introduction to the modeling of complex biological systems using principles of transport phenomena and biochemical kinetics. Topics include the conservation of mass and momentum using differential and integral balances; rheology of Newtonian and non-Newtonian fluids; steady and transient diffusion in reacting systems; dimensional analysis; homogeneous versus heterogeneous reaction systems. Biomedical and biotechnological applications are discussed. (.25 ED/ .75 ES) C-L: Civil Engineering 207 and Mechanical Engineering 207. One course. *Katz or Truskey*

208. Theoretical and Applied Polymer Science. (.6 ED/ .4 ES) See C-L: Mechanical Engineering 211. One course. *H. Clark*

209. Kinetics and Reactor Design. Introduction to chemical and biochemical reaction stoichiometry and kinetics. Concepts of elementary reactions, reaction sequences, steady-state approximations, and rate-limiting steps. Ideal and non-ideal isothermal and non-isothermal reactor design and analysis. Homogeneous and heterogeneous reactor concepts, multiplicity, mass transfer limitations. (.5 ED/ .5 ES) Prerequisite: Mathematics 111 or consent of instructor. C-L: Civil Engineering 209. One course. *Staff*

211. Theoretical Electrophysiology. Advanced topics on the electrophysiological behavior of nerve and striated muscle. Source-field models for single-fiber and fiber bundles lying in a volume conductor. Forward and inverse models for EMG and ENG. Bidomain model. Model and simulation for stimulation of single-fiber and fiber bundle. Laboratory exercises based on computer simulation, with emphasis on quantitative

behavior and design. Readings from original literature. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 101L or 201L or equivalent. One course. *Barr or Krassowska*

212. Theoretical Electrocardiography. Electrophysiological behavior of cardiac muscle. Emphasis on quantitative study of cardiac tissue with respect to propagation and the evaluation of sources. Effect of junctions, inhomogeneities, anisotropy, and presence of unbounded extracellular space. Bidomain models. Study of models of arrhythmia, fibrillation, and defibrillation. Electrocardiographic models and forward simulations. Laboratory exercises based on computer simulation, with emphasis on quantitative behavior and design. Readings from original literature. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 101L or 201L or equivalent. One course. *Barr*

215. Biomedical Materials and Artificial Organs. Chemical structures, processing methods, evaluation procedures, and regulations for materials used in biomedical applications. Applications include implant materials, components of ex vivo circuits, and cosmetic prostheses. Primary emphasis on polymer-based materials and on optimization of parameters of materials which determine their utility in applications such as artificial kidney membranes and artificial arteries. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 83L, Chemistry 151L or Engineering 83L or consent of instructor. C-L: Mechanical Engineering 215. One course. *H. Clark or Reichert*

216. Transport Phenomena in Cells and Organs. Applications of the principles of mass and momentum transport to the analysis of selected processes of biomedical and biotechnological interest. Emphasis on the development and critical analysis of models of the particular transport process. Topics include: reaction-diffusion processes, transport in natural and artificial membranes, dynamics of blood flow, pharmacokinetics, receptor-mediated processes and macromolecular transport, normal and neoplastic tissue. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 207 or equivalent. One course. *Truskey*

222. Principles of Ultrasound Imaging. Propagation, reflection, refraction, and diffraction of acoustic waves in biologic media. Topics include geometric optics, physical optics, attenuation, and image quality parameters such as signal-to-noise ratio, dynamic range, and resolution. Emphasis is placed on the design and analysis of medical ultrasound imaging systems. (.5 ED/.5 ES) Prerequisites: Mathematics 111 and Physics 52L. One course. *von Ramm*

223. Cellular and Integrative Cardiovascular Physiology and Biophysics. Electrical and mechanical properties of the heart at the cellular and organ levels; reflex control of cardiac output; the heart as an endocrine organ; interaction between heart, kidney, and lung; comparative cardiac physiology. Prerequisites: Cell Biology 203 or equivalent and Physics 52L or equivalent; consent of instructor or graduate status. C-L: Cell Biology 223. One course. *Benjamin and staff*

230. Biomechanics. Kinematic models of human motions, mechanical properties of bone and soft tissues, load directed growth mechanisms, human tolerance to impact and vibration, head injury criteria applied to helmet design. (.5 ED/.5 ES) One course. *McElhaney*

231. Intermediate Biomechanics. Biomechanics of hard and soft tissues: nonlinear viscoelastic behavior of tendon and ligament; poroelastic behavior of cartilage and meniscus; continuum modeling of bone. Emphasis will be placed on experimental techniques used to evaluate these tissues. Student seminars on topics in applied biomechanics will be included. (.5 ED/.5 ES) Prerequisites: Biomedical Engineering 110L or Engineering 75L or equivalent, and Biomedical Engineering 83L or Engineering 83L or equivalent. One course. *Myers*

233. Modern Diagnostic Imaging Systems. The underlying concepts and instrumentation of several modern medical imaging modalities. Review of applicable linear systems theory and relevant principles of physics. Modalities studied include X-ray radiography (conventional film-screen imaging and modern electronic imaging), computerized tomography (including the theory of reconstruction), and nuclear magnetic resonance imaging. (.5 ED / .5 ES) Prerequisite: junior or senior standing. One course. *Floyd*

235. Acoustics and Hearing. The generation and propagation of acoustic (vibrational) waves and their reception and interpretation by the auditory system. Topics under the heading of generation and propagation include free and forced vibrations of discrete and continuous systems, resonance and damping, and the wave equation and solutions. So that students may understand the reception and interpretation of sound, the anatomy and physiology of the mammalian auditory system are presented; and the mechanics of the middle and inner ears are studied. (.5 ED / .5 ES) Prerequisites: Mathematics 111 and Physics 52L or equivalents. One course. *Trahey*

237. Biosensors. Biosensors defined as the use of biospecific recognition mechanisms in the detection of analyte concentration. The basic principles of protein binding with specific reference to enzyme-substrate, lectin-sugar, antibody-antigen, and receptor-transmitting binding. Simple surface diffusion and absorption physics at surfaces with particular attention paid to surface binding phenomena. Optical, electrochemical, gravimetric, and thermal transduction mechanisms which form the basis of the sensor design. (.5 ED / .5 ES) Prerequisites: Biomedical Engineering 215 and consent of instructor. One course. *Reichert*

241. Artificial Intelligence in Medicine. Basic concepts of artificial intelligence (AI) and in-depth examination of medical applications of AI. Knowledge of heuristic programming; brief examination of classic AI programming languages (LISP and PROLOG) and AI programming; rule-based systems and cognitive models. (.5 ED / .5 ES) One course. *Hales or Hammond*

243. Introduction to Medical Informatics. An introduction to medical informatics: an in-depth study of the use of computers in biomedical applications. Hardware, software, and applications programming. Data collection, analysis, and presentation studied within application areas such as patient monitoring, computer-based medical records, computer-aided decision making, computer-aided instruction, quality assurance laboratory systems, wave form analysis, hospital information systems, and medical information systems. (.5 ED / .5 ES) One course. *Hales or Hammond*

244. Mathematical Models of Physiological Systems. Mathematical modeling and computer simulation of physiological and other biomedical systems. Formulation of quantitative models of physiological processes using methods drawn from a variety of engineering disciplines including transport phenomena, feedback control, and continuum mechanics. Digital techniques for the solution of coupled nonlinear equations, emphasizing systems of ordinary and partial differential equations. Selected readings from the literature covering current models of cardiovascular, renal, neural, respiratory, and sensory systems. (.5 ED / .5 ES) Prerequisite: Mathematics 111 or equivalent. One course. *Pasipoularides*

246. Computational Methods in Biomedical Engineering. Introduction to practical computational methods for data analysis and simulation with a major emphasis on implementation. Methods include numerical integration and differentiation, extrapolation, interpolation, splining FFTs, convolution, ODEs, and simple one- and two-dimensional PDEs using finite differencing. Introduction to concepts for optimizing codes on a CRAY-YMP. Examples from biomechanics, electrophysiology, and imaging. Project work included and students must have good working knowledge of Unix, Fortran, or

C. Intended for graduate students and seniors who plan on attending graduate school. (.5 ED/ .5 ES) Prerequisite: Engineering 53L or equivalent, Mathematics 111 or equivalent, or consent of instructor. One course. *Henriquez*

250. Cardiovascular Mechanics. Mechanical principles and their applications in the human circulatory system. The coupling of solid and fluid behavior in cardiovascular organs is emphasized. Topics include: gravity and the circulation, kinematics of blood flow and circulatory volume balances, peripheral resistance, wall stresses and deformations, cardiac cycle and cardiac work, circulatory wave propagation, unsteady velocity profiles and boundary layers. Special student projects involve the design of diagnostic and therapeutic instruments and devices for cardiovascular applications. (.5 ED/ .5 ES) Prerequisites: Biomedical Engineering 110L and Mathematics 111 or equivalent. One course. *Paspoularides*

255. Safety of Medical Devices. Safety of medical devices such as prosthetic heart valves and silicone breast implants. Engineering analysis of the safety of biomedical instrumentation in the context of the regulations of the U.S. Food and Drug Administration. Engineering performance standards and FDA requirements for clinical trials for selected medical devices such as medical diagnostic ultrasound, surgical lasers, and prosthetic heart valves. Students will prepare a mock application for FDA premarket approval to demonstrate safety of a selected medical device. (.25 ED/ .75 ES) Prerequisite: junior or senior standing. One course. *S. Smith*

264. Medical Instrument Design. General principles of signal acquisition, amplification processing, recording, and display in medical instruments. System design, construction, and evaluation techniques will be emphasized. Methods of real-time signal processing will be reviewed and implemented in the laboratory. Each student will design, construct, and demonstrate a functional medical instrument and collect and analyze data with that instrument. Formal write-ups and presentations of each project will be required. (.75 ED/ .25 ES) Prerequisite: Biomedical Engineering 164L or equivalent or senior standing. One course. *Trahey*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Consent of instructor required. (.5 ED/ .5 ES) One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

132. Statistical and Computational Methods in Signal Processing

206L. Microprocessors and Digital Instruments

THE MAJOR

The major requirements are included in the minimum total of thirty-four courses listed under general requirements and departmental requirements. The following specific courses must be included: Biomedical Engineering 101, 163, 164, and 207.

Civil and Environmental Engineering (CE)

Professor Petroski, *Chair*; Associate Professor Pas, *Director of Undergraduate Studies*; Professors Haff, Melosh, S. Utku, Vesilind, and J. F. Wilson; Associate Professors Hueckel, Kabala, Malin, Medina, Peirce, and Reckhow; Assistant Professors Boadu, Faust, Jacobs, Katul, Laursen, Rojstczer, and Virgin; Professor Emeritus Brown; Adjunct Associate Professors Piver and B. Utku; Visiting Professor Narayanan

A major in civil engineering is available in this department.

The infrastructure that makes up what we refer to as civilization is, for the most part, the work of civil and environmental engineers. Improving, or even maintain-

ing, the quality of life is ever more challenging as urban problems in the industrialized nations of the world intensify, while rapid urbanization in many developing countries creates other problems for the civil and environmental engineer. The planning, design, construction, and maintenance of necessary facilities, in an era of increasingly scarce monetary and other resources, demands civil and environmental engineers dedicated to work for the public good and prepared to seek more efficient and effective solutions based on current technology.

The challenges faced by civil and environmental engineers vary widely in nature, size, and scope, and encompass both the public and private sectors. Examples include: space structures and launch facilities, hazardous waste disposal facilities, water supply and treatment facilities, power plants, bridges, dams, buildings, tunnels, highways, subways, seaports, airports, and offshore structures. The professors of the Department of Civil and Environmental Engineering at Duke strive to educate their students to assume leadership roles in their chosen careers as well as to recognize their professional and personal obligations to the broader society and culture. The faculty strives to provide a holistic educational experience where the humanities and the physical and social sciences form the foundation for the critical thinking and skills that allows graduates to enjoy the benefits of a liberal education.

Students can emphasize any one of the specialty areas in which the faculty is engaged in teaching and research, including: environmental engineering, structural engineering and mechanics, transportation and systems engineering, water resources, and geotechnical engineering. The department also offers a program in architectural engineering. Students may also enroll in the BSE/MBA degree program and after five years of study obtain an engineering degree and an MBA degree from Duke's Fuqua School of Business. In addition, students may pursue a degree in civil engineering coupled with a double major in another department at Duke. Examples of recently completed double majors reflect the breadth of interests shared by civil and environmental engineering students at Duke: public policy studies, economics, French, mathematics, and music.

The civil and environmental program at Duke is built upon the expertise and experience of a prominent faculty and is supported by commensurate laboratory and instructional facilities. The civil and environmental engineering professors are committed to providing quality classroom instruction, advising, and laboratory experiences in settings that encourage student-faculty as well as student-student interactions. The faculty conducts research of national and international consequence, and undergraduates have ample opportunities to be involved in such research, through undertaking independent study projects and/or by working as research assistants. The research facilities in the department, including laboratory equipment and instrumentation as well as computer resources, are comparable to those found in other major universities.

Graduates of the Department of Civil and Environmental Engineering are able to select from a wide range of career paths. Some recent graduates have pursued advanced study in engineering, business, law, and architecture, while others have accepted positions with major corporations and federal, state, and local government agencies as design engineers and project managers.

99. Structures in Byzantine Architecture. Introduction to the structural behavior of various architectural forms through case studies in Byzantine and Ottoman architectures. Critical evaluation of these forms and their materials. Taught in the Duke in Istanbul Program. (1.0 ES) Prerequisite: sophomore standing. One course. *B. Utku*

116. Transportation Engineering. The role and history of transportation. Introduction to the planning and design of multimodal transportation systems. Principles of traffic engineering, route location, and geometric design. Planning studies and economic

evaluation. (.5 ED/.5 ES) Prerequisites: Statistics 113 and consent of instructor for nonengineering students. One course. *Pas*

122L. Fluid Mechanics. Physical properties of fluids; fluid-flow concepts and basic equations; continuity, energy, and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications emphasizing real fluids. Selected laboratory work. (.3 ED/.7 ES) Corequisite: Engineering 123L. One course. *Jacobs or Medina*

123L. Water Resources Engineering. Descriptive and quantitative hydrology, hydraulics of pressure conduits and measurement of flow, compound pipe systems, analysis of flow in pressure distribution systems, open channel flow, reservoirs and distribution system storage. Groundwater hydrology and well-hydraulics. Probability and statistics in water resources. Selected laboratory and field exercises, computer applications. (.15 ED/.85 ES) Prerequisite: Civil Engineering 122L. One course. *Medina*

124L. Environmental Engineering. Qualitative and quantitative physical, chemical, and biological characterization of water and wastewater. Introduction to water treatment processes and wastewater collection, treatment and disposal systems. Air pollution control; solid and hazardous waste management. Laboratory included. Field trips to be arranged. (.75 ED/.25 ES) Prerequisite: Civil Engineering 123L. One course. *Peirce*

127. Environmental Pollution Control. A study of the environmental causes and effects of air, land, and water pollution. Interactions between the environment and stresses to which it is subjected as a consequence of growth and concentration of populations and their increasing demands on natural resources. Solid waste, recycling, noise pollution, and environmental ethics. Not open to engineering majors. (1.0 ES) One course. *Vesilind*

131L. Theory of Structures. Application of the principles of mechanics of deformable bodies to the analysis of plane and space structures: linear analysis by hand and by machine, of statically determinate and indeterminate structures of one-dimensional elements, with the force, displacement, and mixed methods. (.3 ED/.7 ES) Prerequisites: Engineering 75L and Mathematics 103. One course. *S. Ulku*

133L. Structural Design I. Nonhomogenous materials. Determination of physical and mechanical properties of construction materials. Theory and design of compression and flexural members. Emphasis on ultimate strength theory for concrete. Timber design using mechanical fasteners. Laboratory exercises include concrete aggregate evaluation, concrete mix design, and structural timber tests. (1.0 ED) Prerequisite: Civil Engineering 131L. One course. *Narayanan*

134L. Structural Design II. Design in metals, primarily steel. Properties of materials as criteria for failure. Tension, compression, and flexural members. Bolted and welded connections, including eccentric connections. Built-up members. Design by elastic and plastic methods. Selected problems to include computations and drawings. (1.0 ED) Prerequisite: Civil Engineering 131L. One course. *Narayanan*

139L. Introduction to Soil Mechanics. Origin and composition of soils, soil structure. Flow of water through soils; capillary and osmotic phenomena. Environmental geotechnology. Soil behavior under stress; compressibility, shear strength. Elements of mechanics of soil masses with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. Laboratory included. (.5 ED/.5 ES) Prerequisite: Civil Engineering 122L. One course. *Hueckel*

141, 142. Special Topics in Civil Engineering. Study arranged on a special topic in which the instructor has particular interest and competence. Consent of instructor and

director of undergraduate studies required. Half course or one course each. Variable credit. *Staff*

161. Architectural Engineering I. Analysis of the building through the study of its subsystems (enclosure, space, structural, environmental-control). Building materials and their principal uses in the enclosure and structural subsystems. Computer aided design. Field trips. (.5 ED/.5 ES) Prerequisite: junior or senior standing, consent of instructor for nonengineering students. One course. *B. Utku*

162. Architectural Engineering II. Design and integration of building subsystems (enclosure, space, structural, environmental-control) in the design of a medium-sized building. (1.0 ED) Prerequisite: Civil Engineering 161 or consent of instructor. One course. *B. Utku*

192. Civil Engineering Design. Student design teams complete a preliminary design of an actual civil engineering project and present the design to a panel of civil engineering faculty and practitioners. A written technical report is required. Topics to be addressed include: the design process; cost estimation; legal, ethical, and social aspects of professional engineering practice; short-term and long-term design serviceability considerations. Open only to civil engineering students during their final two semesters. (1.0 ED) One course. *Jacobs*

197, 198. Projects in Civil Engineering. These courses may be taken by junior and senior engineering students who have demonstrated aptitude for independent work. Consent of instructor and director of undergraduate studies required. Half course or one course each. Variable credit. *Staff*

201. Advanced Mechanics of Solids. Tensor fields and index notation. Analysis of states of stress and strain. Conservation laws and field equations. Constitutive equations for elastic, viscoelastic, and elastic-plastic solids. Formulation and solution of simple problems in elasticity, viscoelasticity, and plasticity. (1.0 ES) One course. *Hueckel, Laursen, or Petroski*

203. Plasticity. Inelastic behavior of soils and engineering materials. Yield criteria. Flow rules. Concepts of perfect plasticity and plastic hardening. Methods of rigid-plasticity. Limit analysis. Isotropic and kinematic hardening. Plastic softening. Diffused damage. Thermo-plasticity. Visco-plasticity. (1.0 ES) Prerequisite: Civil Engineering 201 or consent of instructor. One course. *Hueckel*

204. Plates and Shells. Differential equation and extremum formulations of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian plates of isotropic and orthotropic material. Solution methods. Differential equation formulation of thin shell problems in curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution, and plates. Extremum formulation of shell problems. Solution methods. (1.0 ES) Prerequisites: Engineering 75L or 135 and Mathematics 111. One course. *S. Utku*

205. Elasticity. Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and flexure problems. Plane, axisymmetric, and three-dimensional problems. (1.0 ES) One course. *Petroski*

207. Transport Phenomena in Biological Systems. (.25 ED/.75 ES) See C-L: Biomedical Engineering 207; also C-L: Mechanical Engineering 207. One course. *Katz or Truskey*

209. Kinetics and Reactor Design. (.5 ED/.5 ES) Prerequisite: Mathematics 111 or consent of instructor. See C-L: Biomedical Engineering 209. One course. *Staff*

210. Intermediate Dynamics. (.25 ED / .75 ES) See C-L: Mechanical Engineering 210. One course. *Hall or Knight*

215. Engineering Systems Analysis. Fundamental concepts and tools for engineering systems analysis, including optimization techniques and decision analysis. System definition and model formulation, optimization by calculus, linear programming, integer programming, separable integer programming, nonlinear programming, network analysis, dynamic programming, and decision analysis. Application to diverse engineering systems. (.25 ED / .75 ES) One course. *Pas*

217. Transportation Systems Analysis. The transportation systems planning process. Quantitative analysis; mathematical modeling and computer simulation techniques for short-and long-range planning and evaluation of transportation systems. (1.0 ES) Prerequisite: (or corequisite) Civil Engineering 116 or consent of instructor. One course. *Pas*

218. Engineering Management and Project Evaluation. Economics and statistical analysis. Economic impact assessment, supply and demand forecasting, benefit/cost analysis, economic incentives, public and private finance, input/output analysis. Data organization, distributions, estimates of parameters, hypothesis testing, analysis of variance, and experimental design. (1.0 ES) One course. *Peirce*

220. Water Resources Systems Planning and Management. Focus on the development and application of mathematical modeling techniques to water resources systems problems. Deterministic and stochastic river basin modeling, irrigation planning and modeling, water quality prediction and management, wetlands management, the optimal expansion of existing water resources systems and reservoir operations. Emphasis on development and application of optimization models for the planning and management of complex water resources systems involving the interaction of groundwater and surface water resources. Mathematical techniques include linear and dynamic programming, Monte Carlo simulation, simulated annealing, nonlinear optimization and stochastic optimization. (.5 ED / .5 ES) Prerequisites: Civil Engineering 123L and Civil Engineering 215 or Engineering 115 or equivalent. One course. *Jacobs*

221. Engineering Systems Reliability, Safety, and Risk Assessment. Introduction to the concepts of design reliability and safety. Topics include: concepts of probability in engineering planning and design, decision analysis and assessment of reliability, modeling and analysis of uncertainty, reliability-based design, multiple failure mode analysis, redundant and nonredundant systems, and fault tree analysis. Emphasis on determining the probability of failure for numerous engineering systems including structural systems, infrastructure systems, water treatment systems, environmental systems, and transportation networks. (.5 ED / .5 ES) Prerequisite: Mathematics 111 or consent of instructor. One course. *Jacobs*

225. Dynamic Engineering Hydrology. Dynamics of the occurrence, circulation, and distribution of water; climate, hydrometeorology, geophysical fluid motions. Precipitation, surface runoff and stream flow, infiltration, water losses. Hydrograph analysis, catchment characteristics, hydrologic instrumentation, and computer simulation models. (1.0 ES) Prerequisite: Civil Engineering 122L or consent of instructor. One course. *Medina*

227. Groundwater Hydrology and Contaminant Transport. Review of surface hydrology and its interaction with groundwater. The nature of porous media, hydraulic conductivity, and permeability. General hydrodynamic equations of flow in isotropic and anisotropic media. Water quality standards and contaminant transport processes: advective-dispersive equation for solute transport in saturated porous media. Analytical and numerical methods, selected computer applications. Deterministic versus stochastic

models. Applications: leachate from sanitary landfills, industrial lagoons and ponds, subsurface wastewater injection, monitoring of groundwater contamination. Conjunctive surface-subsurface models. (.1 ED/.9 ES) Prerequisite: Civil Engineering 123L or consent of instructor. One course. *Medina*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. (1.0 ED) Prerequisite: Civil Engineering 133L. One course. *Narayanan*

237. Advanced Soil Mechanics. Characterization of behavior of geomaterials. Stress-strain incremental laws. Nonlinear elasticity, hypo-elasticity, plasticity and viscoplasticity of geomaterials; approximated laws of soil mechanics; fluid-saturated soil behavior; cyclic behavior of soils; liquefaction and cyclic mobility; elements of soil dynamics; thermal effects on soils. (1.0 ES) Prerequisite: Civil Engineering 139L or equivalent. One course. *Hueckel*

240. Fate of Organic Chemicals in the Aquatic Environment. Kinetic, equilibrium, and analytical approaches applied to quantitative description of processes affecting the fate of anthropogenic and natural organic compounds in surface and groundwaters and in selected treatment processes, including sorption phenomena, gas transfer, hydrolysis, photochemistry, oxidation-reduction, and biodegradation. Sampling, detection, identification, and quantification of organic compounds in the environment. Gas and liquid chromatography and mass spectrometry. (1.0 ES) Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Environment 240. One course. *Dubay and Faust*

241. Atmospheric Chemistry and Air Pollution. Chemical kinetics and equilibrium applied to the mechanistic and quantitative description of processes affecting the fates of anthropogenic and natural chemicals in the troposphere, on local, regional, and global scales. Direct photolysis; gas-phase photo-formation and fates of ozone, radicals, and other oxidants; gas-phase oxidations of volatile organic compounds; gas-to-drop partitioning; aqueous-phase photoformation and fates of hydrogen peroxide, radicals, and other oxidants in the aqueous phases of clouds, fogs, and aerosols; effects of aqueous-phase reactions on the chemical composition of the troposphere; gas-phase and aqueous-phase oxidations of organic and inorganic compounds; stratospheric ozone depletion. (1.0 ES) Prerequisites: university-level general chemistry and organic chemistry within last four years. C-L: Environment 241. One course. *Faust*

242. Environmental Aquatic Chemistry. Principles of chemical kinetics and equilibria applied to quantitative description of the chemistry of lakes, rivers, oceans, groundwaters, and selected treatment processes. Equilibrium, steady state, and other kinetic models applied to processes such as the carbonate system, coordination chemistry, precipitation and dissolution, oxidation-reduction, photochemistry, adsorption, and heterogeneous reactions. (1.0 ES) Prerequisite: university-level general chemistry within last four years. C-L: Environment 242. One course. *Faust*

243. Physicochemical Unit Operations in Water Treatment. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and absorption processes. Emphasis on physical and chemical treatment combinations for drinking water supply. (.25 ED/.75 ES) Prerequisite: Civil Engineering 124L. One course. *Kabala*

244. Applied Microbial Processes. Existing and novel microbial processes as they pertain to biotechnological products, specialty bioconversions, and to treat or exploit wastes. Concepts of microbiology, chemical engineering, the stoichiometry and kinetics of complex microbial metabolism, and process analysis. Specific processes such as

carbon oxidation, vinegar and alcohol production, nitrification, methane production, biological electricity generation, recombinant protein secretion, and wastewater treatment in long-term space travel are discussed. Consent of instructor required. (.25 ED / .75 ES) One course. *Staff*

245. Pollutant Transport Systems. Distribution of pollutants in natural waters and the atmosphere; diffusive and advective transport phenomena within the natural environment and through artificial conduits and storage/treatment systems. Analytical and numerical prediction methods. (.1 ED / .9 ES) Prerequisites: Civil Engineering 122L and Mathematics 111 or equivalents. One course. *Medina*

246. Water Supply Engineering Design. The study of water resources and municipal water requirements including reservoirs, transmission, treatment and distribution systems; methods of collection, treatment, and disposal of municipal and industrial wastewaters. The course includes the preparation of a comprehensive engineering report encompassing all aspects of municipal water and wastewater systems. Field trips to be arranged. (1.0 ED) Prerequisite: Civil Engineering 124L or consent of instructor. One course. *Vesilind*

248. Solid Waste Engineering. Engineering design of material and energy recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Application of systems analysis to collection of municipal refuse. Major design project in solid waste management. (1.0 ED) Prerequisite: Civil Engineering 124L or consent of instructor. C-L: Environment 248. One course. *Vesilind*

249. Control of Hazardous and Toxic Waste. Engineering solutions to industrial and municipal hazardous waste management problems. Handling, transportation, storage, and disposal technologies. Biological, chemical, and physical processes. Upgrading an abandoned disposal site. Economic and regulatory aspects. Case studies. Consent of instructor required. (.5 ED / .5 ES) One course. *Peirce*

251. Systematic Engineering Analysis. Mathematical formulation and numerical analysis of engineering systems with emphasis on applied mechanics. Equilibrium and eigenvalue problems of discrete and distributed systems; properties of these problems and discretization of distributed systems in continua by the trial functions with undetermined parameters. The use of weighted residual methods, finite elements, and finite differences. (1.0 ES) Prerequisite: senior or graduate standing. One course. *S. Utiku*

252. Buckling of Engineering Structures. An introduction to the underlying concepts of elastic stability and buckling, development of differential equation and energy approaches, buckling of common engineering components including link models, struts, frames, plates, and shells. Consideration will also be given to inelastic behavior, postbuckling, and design implications. (.25 ED / .75 ES) Prerequisite: Civil Engineering 131L or consent of instructor. C-L: Mechanical Engineering 252. One course. *Virgin*

254. Introduction to the Finite Element Method. Investigation of the finite element method as a numerical technique for solving linear ordinary and partial differential equations, using rod and beam theory, heat conduction, elastostatics and dynamics, and advective/diffusive transport as sample systems. Emphasis placed on formulation and programming of finite element models, along with critical evaluation of results. Topics include: Galerkin and weighted residual approaches, virtual work principles, discretization, element design and evaluation, mixed formulations, and transient analysis. (1.0 ES) Prerequisites: a working knowledge of ordinary and partial differential equations, numerical methods, and programming in FORTRAN. One course. *Laursen*

255. Nonlinear Finite Element Analysis. Formulation and solution of nonlinear initial/boundary value problems using the finite element method. Systems include nonlinear heat conduction/diffusion, geometrically nonlinear solid and structural me-

chanics applications, and materially nonlinear systems (for example, elastoplasticity). Emphasis on development of variational principles for nonlinear problems, finite element discretization, and equation-solving strategies for discrete nonlinear equation systems. Topics include: Newton-Raphson techniques, quasi-Newton iteration schemes, solution of nonlinear transient problems, and treatment of constraints in a nonlinear framework. An independent project, proposed by the student, is required (1.0 ES) Prerequisite: Civil Engineering 254 or consent of instructor. One course. *Laurson*

257. Structural Optimization. Computer-aided improvement of structural designs; redesign search processes, sensitivity analysis, integrity analysis; optimization of static, steady-state, and transient response systems; minimization of structural weight and response potentials for trusses, frames, and continua. (.65 ED / .35 ES) One course. *Staff*

265. Advanced Topics in Civil and Environmental Engineering. Opportunity for study of advanced subjects relating to programs within the civil and environmental engineering department tailored to fit the requirements of individuals or small groups. One course. *Staff*

281. Experimental Systems. Formulation of experiments; Pi theorem and principles of similitude; data acquisition systems; static and dynamic measurement of displacement, force, and strain; interfacing experiments with digital computers for data storage, analysis, and plotting. Students select, design, perform, and interpret laboratory-scale experiments involving structures and basic material behavior. (.3 ED / .7 ES) Prerequisite: senior or graduate standing in engineering or the physical sciences. One course. *J. F. Wilson*

283. Structural Dynamics. Formulation of dynamic models for discrete and continuous structures, normal mode analysis, deterministic and stochastic responses to shocks and environmental loading (earthquakes, winds, and waves), introduction to nonlinear dynamic systems, analysis and stability of structural components (beams and cables and large systems such as offshore towers, moored ships, and floating platforms). (1.0 ES) One course. *J. F. Wilson*

COURSES CURRENTLY UNSCHEDULED

202. Advanced Mechanics of Solids II

212. Mechanical Behavior and Fracture of Materials

216. Transportation Planning and Policy Analysis

226. Operational Hydrology

228L. Sludge Management and Disposal

232. Reinforced Concrete Design

234. Advanced Structural Design in Metals

235. Foundation Engineering

236. Earth Structures

238. Rock Mechanics

239. Physical Properties of Soils

247. Air Pollution Control

258. Analysis of Dynamic and Nonlinear Behavior of Structures

THE MAJOR

The major requirements are included in the minimum of thirty-four courses listed under general requirements and departmental requirements. The following specific courses must be included: Engineering 24L, 25L, 75L, 115, 123L, and 150L; Civil Engineering 122L, 131L, and 192.

Electrical Engineering (EE)

Professor Gelenbe, *Chair*; Visiting Professor McCumber, *Director of Undergraduate Studies*; Professors Casey, Fair, Joines, Marinos, Nolte, Trivedi, and Wang; Associate Professors Alexandrou, Board, Kedem, Krolik, and Massoud; Assistant Professors Daniels-Race, George, Hansen, and Overhauser; Professors Emeritus Owen and Wilson; Assistant Research Professor Ybarra; Adjunct Professors Glomb, Lontz, Marin, and Strosio; Adjunct Associate Professors Derby, Dollas, and Kanopoulos; Adjunct Assistant Professors Bottomley, Goodwin-Johansson, Gun, Loeb, Palmer, Rindos, Spanos, and Strole, and Walsh; Visiting Professors lafrate and Kaiser

A major is available in this department.

Electrical engineering is a broadly-based discipline dealing with the processing, control, and transmission of information and energy by making use of electrical and electromagnetic phenomena. Electrical engineers design, build, and make extensive use of computers. The twenty-first century will have continuing demands for electronic systems in most industrial and consumer products.

Graduates with electrical engineering backgrounds are prepared for their first job in engineering or management as well as to undertake graduate or professional school education in a variety of disciplines. The curriculum permits students to concentrate in such areas as computer engineering, signal processing and communications, solid-state electronics and circuits, electromagnetic fields and optics, and electronic systems. The flexibility of the undergraduate curriculum permits students to complete the requirements for a second major in such areas as biomedical engineering, computer science, physics, mathematics, history, public policy studies, and many others. Students with interests such as premedicine, prelaw, economics, art, music, psychology, and social sciences can be accommodated within the curriculum through individually designed programs. The classroom lectures are enhanced by extensive use of the department's computer and laboratory facilities. The department maintains over eighty networked computer workstations, servers, and X-terminals interconnected via an Ethernet network which also gives access to campus, regional, and international data networks, including the Internet. The instructional computers include an IBM RS-6000 series machine, Sun SPARC Classic workstations and servers for advanced computer-aided design (CAD), HP 9000 series workstations, and X-terminals allow access to various computer clusters in the Engineering Building as well as some three dozen departmental Sun, DEC, and IBM workstations.

Numerous undergraduate laboratories are well-equipped with electronic components, digitizing oscilloscopes, PC controlled instrumentation, and commercial quality CAD tools, as well as equipment such as logic analyzers used in computer logic design. Laboratories and equipment are also available for microprocessor and computer architecture studies, rapid system prototyping, custom integrated circuit design and testing, integrated circuit fabrication, digital speech processing, image processing, robotics, digital communications, microwaves, and power electronics. These laboratories are important to the undergraduate program since they permit students to become actively acquainted with the devices and design tools of electrical engineering through regularly scheduled experiments, independent projects, and occasionally, part-time assistance to faculty members engaged in research. Opportunities for independent study are related to the current areas of research which are: computer engineering, computer architecture, fault-tolerant computer systems, scientific computing, parallel processing, VLSI CAD

tools, signal processing, digital speech processing, signal detection and estimation, ocean acoustic signal processing, image processing, solid-state electronics, integrated circuit processing and process simulation, molecular-beam epitaxy, III-V compound semiconductor materials and devices, machine intelligence, applications of electromagnetic fields and waves, power electronics and magnetics.

61L. Introduction to Electric Circuits. Techniques for analyzing linear circuits. Nodal and mesh analysis, superposition and linearity, Thevenin and Norton equivalent circuits, operational amplifiers, energy storage, transient analysis, phasors and impedance, RMS values, AC power, frequency response, resonance, and filters. Circuit simulation using SPICE. (.25 ED/.75 ES) Prerequisite: Mathematics 32. One course. *Staff*

62L. Introduction to Electronics: Devices. Integrated-circuit fabrication. Fundamentals of semiconductor physics. Device modeling. Basic device operation, $I(V)$ characteristics, temperature effects, capacitance effects, equivalent circuit and SPICE models, high-frequency and switching properties of: PN junction diodes, Schottky barriers, bipolar-junction transistors, MOS capacitors, and field-effect transistors. Basic electronic circuits; electronic-circuit analysis and design. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 61L. One course. *Staff*

64. Fundamentals of Linear System Theory. Signal representations, system response, convolution, correlation; Fourier series and transforms, transfer functions; Laplace transforms, state variables, stability; discrete signals and transforms, fast Fourier transform; z transforms. Applications to networks, modulation, sampling, filtering. Computer solutions of problems using MAPLE and SPICE. (1.0 ES) Prerequisite: Electrical Engineering 61L. One course. *Staff*

141. Linear Control Systems. Analysis and design of feedback control systems. Block diagram and signal flow graph system models. Servomechanism characteristics, steady-state errors, sensitivity to parameter variations and disturbance signals. Time domain performance specifications. Stability. Root locus, Nyquist, and Bode analysis; design of compensation circuits; closed loop frequency response determination. Introduction to time domain analysis and design. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 64 or consent of instructor. One course. *Wang*

142. Introduction to Robotics and Automation. Fundamental notions in robotics, basic configurations of manipulator arm design, coordinate transformations, control functions, and robot programming. Applications of artificial intelligence, machine vision, force/torque, touch and other sensory subsystems. Design for automatic assembly concepts, tools, and techniques. Application of automated and robotic assembly costs, benefits, and economic justification. Selected laboratory and programming assignments. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 64 and consent of instructor. One course. *Staff*

151. Introduction to Switching Theory and Logic Design. Techniques for the analysis and design of combinational and sequential networks. Discrete mathematical systems, binary arithmetic, Boolean algebra, minimization of functions, synchronous and fundamental mode sequential circuit design, design with MSI and LSI components, and special properties of switching functions are covered. Selected laboratory work. (.25 ED/.75 ES) C-L: Computer Science 120. One course. *Marinos or Overhauser*

152. Introduction to Computer Architecture. Architecture and organization of digital computer systems. Processor operation, computer arithmetic, instruction set design. Assembly language programming. Selected hardware and software exercises culminating in design and construction of a complete computer system. Not open to students who have taken Computer Science 104. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 151. One course. *Board or Dallas*

156. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. International standards. Satellite communications and local area networks. Performance analysis and modeling of communication networks. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 151. One course. *Strole*

157. Computer Network Analysis and Design. Graph representation of networks. Network design problems as graph optimization problems; related graph algorithms. Elementary queuing models and formulae. Network performance issues. Modern high-speed computer-communication networks. Packet switching. Network protocols. Broadband integrated services networks (B-ISDN) and the asynchronous transfer mode (ATM). Network admission and congestion controls. (.5 ED/.5 ES) One course. *Gun*

163L. Introduction to Electronics: Integrated Circuits. Analysis and design of electronic circuits in bipolar and MOS technologies, with emphasis on both large-signal and small-signal methods. Circuits for logic gates, latches, and memories. Single-stage and multistage amplifiers and op amps. Circuits with feedback, including stability and frequency response considerations. Analog and mixed analog/digital circuit applications. Extensive use of SPICE for circuit simulation. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 62L. One course. *Derby or George*

164L. Electronic Design Projects. Electronics project laboratory in which individuals or small teams, build, and test custom designed circuits or small systems to gain experience in the design process. Requirements: a written plan, project organization, a written report describing the project and test results, a presentation to the class of the constructed project. Enrollment limited to 20. (1.0 ED) Prerequisites: Electrical Engineering 163L (or Biomedical Engineering 163L with consent of instructor) and at least one of 141, 151, or 181. One course. *Staff*

170L. Introduction to Electromagnetic Fields. Postulatory treatment of electromagnetic fields based on Maxwell's equations. Discussion of the Lorentz force equation and the Poynting theorem. Treatment of propagation, reflection, and transmission of plane waves through various media and dielectric interfaces. Introduction to electrostatic and magnetostatic fields and potential functions. (.25 ED/.75 ES) Prerequisites: Mathematics 104 or 111 and Physics 52L. One course. *Joines*

171. Applications of Electromagnetic Fields and Waves. Solution techniques applied to static and dynamic field problems. Discussions and example applications include the following topics: waves and transmission lines, waveguides and resonators, antennas and radiation, and electromagnetic forces and energy. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 170L. One course. *Joines*

176. Thermal Physics. Thermal properties of matter treated using the basic concepts of entropy, temperature, chemical potential, partition function and free energy. Topics include the laws of thermodynamics, ideal gases, thermal radiation and electrical noise, heat engines, Fermi-Dirac and Bose-Einstein distributions, semiconductor statistics, kinetic theory, and phase transformations. (1.0 ES) Prerequisites: Mathematics 103 or equivalent and Physics 51L, 52L or equivalent. C-L: Physics 176. One course. *McCumber or Teitsworth*

181. Fundamentals of Signal Processing and Communications. The fundamentals of signal representation and system characterization used in digital signal processing and communications. Communication systems: basic concepts in amplitude modulation, frequency division multiplexing, amplitude shift keying, pulse code modulation, matched filtering. Discrete-time signal processing: discrete-time systems, response with noisy excitation, introduction to digital filter design, discrete Fourier transform, fast

Fourier transform. Computer applications in selected areas using MATLAB. (.25 ED/ .75 ES) Prerequisites: Electrical Engineering 64 and Mathematics 135 or Statistics 113, or consent of instructor. One course. *Alexandrou, Hansen, or Nolte*

182. Digital Filter Design. A treatment of the theory and application of processing of discrete time data. Special attention will be given to the design and implementation of both finite impulse response (FIR) and infinite impulse response (IIR) digital filters. Bilinear transformations, filter design based on Butterworth, Chebyshev, and elliptic approximations, transversal filters, effects of quantization and finite word length arithmetic in digital filters. Applications of digital signal processing in such areas as image, sonar/ radar, and speech communications. (.75 ED/ .25 ES) Prerequisite: Electrical Engineering 181. One course. *Alexandrou, Hansen, or Nolte*

187. Digital Telecommunications. Examination of existing telephone networks in the U.S. with emphasis on the transition from analog to digital systems. Sequential processes of encoding, transmission, switching, and network hierarchy. Consideration of the problems which must be solved in the transition from analog to digital networks. (.5 ED/ .5 ES) Prerequisite: Electrical Engineering 181. One course. *Glomb*

189. Image Processing. Basic concepts of the manipulation and analysis of images by computer, linear operations on pictures, Fourier transform and 2-D Z-transform, hexagonal sampling theorem, image transforms, image enhancement, image filtering and restoration, image coding, matching, segmentation, representation and description. Project presentation by students. (.5 ED/ .5 ES) Prerequisites: Electrical Engineering 181 and Mathematics 135. One course. *Staff*

191, 192. Undergraduate Research in Electrical Engineering. For juniors only. (Var. ED/ES) Half course or one course each. Variable credit. *Staff*

193, 194. Undergraduate Research in Electrical Engineering. For seniors only. (Var. ED/ES) Half course or one course each. Variable credit. *Staff*

195, 196. Special Topics in Electrical Engineering. Study of selected topics in electrical engineering tailored to fit the requirements of a small group. Consent of instructor and director of undergraduate studies required. (Var. ED/ES) Half course or one course each. Variable credit. *Staff*

197, 198. Projects in Electrical Engineering. A course which may be undertaken only by seniors who are enrolled in the graduation with distinction program or who show special aptitude for individual project work. Elective for electrical engineering majors. Consent of director of undergraduate studies required. (Var. ED/ES) Half course to two courses each. Variable credit. *Staff*

199. Discrete Mathematics. Mathematics as applied to finite and infinite collections of discrete objects, including techniques for solving engineering problems involving finite and infinite sets, permutations and combinations of elements, discrete numeric functions, finite and infinite sums. Mathematical methods needed to tackle real-world problems in Computer Engineering, Applied Mathematics, Computer Science, and Engineering. (1.0 ES) One course. *Marin*

211. Quantum Mechanics. Discussion of wave mechanics including elementary applications, free particle dynamics, Schrödinger equation including treatment of systems with exact solutions, and approximate methods for time-dependent quantum mechanical systems with emphasis on quantum phenomena underlying solid-state electronics and physics. (1.0 ES) Prerequisite: Mathematics 111 or equivalent. One course. *Staff*

214. Introduction to Solid-State Physics. Discussion of solid-state phenomena including crystalline structures, X-ray and particle diffraction in crystals, lattice dynam-

ics, free electron theory of metals, energy bands, and superconductivity, with emphasis on understanding electrical and optical properties of solids. (.25 ED/.75 ES) Prerequisite: quantum physics at the level of Physics 143L or Electrical Engineering 211. C-L: Physics 214. One course. *Teitsworth*

215. Semiconductor Physics. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include band theory and conduction phenomena; equilibrium and nonequilibrium charge carrier distributions; charge generation, injection, and recombination; drift and diffusion processes. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 211 or consent of instructor. One course. *Daniels-Race*

216. Devices for Integrated Circuits. Derivation of basic semiconductor properties such as the effective mass, effective density of states, SHR recombination, avalanche breakdown and energy-band diagrams. Application of the continuity equation, Gauss' law, and Poisson's equation to obtain the I-V and C-V behavior of Si and GaAs Schottky barriers, GaAs MESFETs; Si JFETs, bipolar transistors and MOSFETs. Relation of device physics to SPICE parameters. Four laboratory exercises. (.25 ED/.75 ES) One course. *Casey*

217. Analog Integrated Circuits. Analysis and design of bipolar and CMOS analog integrated circuits. SPICE device models and circuit macromodels. Classical operational amplifier structures, current feedback amplifiers, and building blocks for analog signal processing, including operational transconductance amplifiers and current conveyors. Biasing issues, gain and bandwidth, compensation, and noise. Influence of technology and device structure on circuit performance. Extensive use of industry-standard CAD tools, such as Analog Workbench. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 216. One course. *Staff*

218. Integrated Circuit Engineering. Basic processing techniques and layout technology for integrated circuits. Photolithography, diffusion, oxidation, ion implantation, and metallization. Design, fabrication, and testing of integrated circuits. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 216. One course. *Fair*

219. Digital Integrated Circuits. Analysis and design of digital integrated circuits. IC technology. Switching characteristics and power consumption in MOS devices, bipolar devices, and interconnects. Analysis of digital circuits implemented in NMOS, CMOS, TTL, ECL, and BiCMOS. Propagation delay modeling. Analysis of logic (inverters, gates) and memory (SRAM, DRAM) circuits. Influence of technology and device structure on performance and reliability of digital ICs. SPICE modeling. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 151 and 216. One course. *Massoud*

243. Pattern Classification and Recognition. Parameter estimation and supervised learning, nonparametric techniques, linear discriminant functions, clustering, language theory related to pattern recognition, examples from areas such as character and severe weather recognition, classification of community health data, recognition of geometrical configurations, algorithms for recognizing low resolution touch-sensor array signatures and 3-D objects. Consent of instructor required. (.5 ED/.5 ES) One course. *Wang*

245. Digital Control Systems. Review of traditional techniques used for the design of discrete-time control systems; introduction of "nonclassical" control problems of intelligent machines such as robots. Limitations of the assumptions required by traditional design and analysis tools used in automatic control. Consent of instructor required. (.25 ED/.75 ES) One course. *Staff*

246. Optimal Control. Review of basic linear control theory and linear/nonlinear programming. Dynamic programming and the Hamilton-Jacobi-Bellman Equation. Calculus of variations. Hamiltonian and costate equations. Pontryagin's Minimum Principle. Solution to common constrained optimization problems. This course is de-

signed to satisfy the need of several engineering disciplines. (.25 ED / .75 ES) Prerequisite: Electrical Engineering 141 or equivalent. C-L: Mechanical Engineering 232. One course. *Rindos*

251. Advanced Digital System Design. Theory and hands-on experience in advanced digital system design. High-speed design, high complexity design (more than 10,000 gates), implementation technology selection, system modeling, power and clock distribution, line termination, and cooling. Case studies and demonstrations. Extensive use of CAD tools for logic minimization, logic synthesis, and system simulation. Rapid system prototyping with off-the-shelf and custom components. Laboratory exercises and a semester project. (.75 ED / .25 ES) Prerequisites: Electrical Engineering 151 and 163L (or Biomedical Engineering 163L with consent of instructor). One course. *Kanopoulos*

252. Advanced Digital Computer Architecture. A second course on computer architecture. Definition of high-performance computing. The von Neumann bottleneck, Amdahl's law. Computer taxonomies. Memory organization, Princeton/Harvard architectures, caches, and virtual memory. Instruction pipelining. Vector processing. Instruction sets (RISC/CISC/VLIW). Parallel processing (SIMD/MIMD). Multiprocessor interconnection networks, communications, and synchronization. (.5 ED / .5 ES) Prerequisite: Computer Science 104 or Electrical Engineering 152. One course. *Board or Dallas*

253. Parallel System Performance. Intrinsic limitations to computer performance. Amdahl's Law and its extensions. Components of computer architecture and operating systems, and their impact on the performance available to applications. Intrinsic properties of application programs and their relation to performance. Task graph models of parallel programs. Estimation of best possible execution times. Task assignment and related heuristics. Load balancing. Specific examples from computationally intensive, I/O intensive, and mixed parallel and distributed computations. Global distributed system performance. (.6 ED / .4 ES) Prerequisites: Computer Science 110; Electrical Engineering 151 and 152. One course. *Gelenbe*

254. Fault-Tolerant and Testable Computer Systems. Faults and failure mechanisms, test generation techniques and diagnostic program development for detection and location of faults in digital networks; design for testability, redundancy techniques, self-checking and fail-safe networks, fault-tolerant computer architectures. (.5 ED / .5 ES) Prerequisite: Electrical Engineering 151 or equivalent. C-L: Computer Science 225. One course. *Marinos*

255. Mathematical Methods for Systems Analysis I. Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics, queuing theory, and simulation. (.25 ED / .75 ES) Prerequisite: four semesters of college mathematics. C-L: Computer Science 226. One course. *Trivedi*

257. Performance and Reliability of Computer Networks. Methods for performance and reliability analysis of local area networks as well as wide area networks. Probabilistic analysis using Markov models, stochastic Petri nets, queuing networks, and hierarchical models. Statistical analysis of measured data and optimization of network structures. (.25 ED / .75 ES) Prerequisites: Electrical Engineering 156 and 255. One course. *Trivedi*

258. Artificial Neural Networks. Elementary biophysical background for signal propagation in natural neural systems. Artificial neural networks (ANN) and the history of computing; early work of McCulloch and Pitts, of Kleene, of von Neumann and others. The McCulloch and Pitts model. The connectionist model. The random neural network model. ANN as universal computing machines. Associative memory; learning; algorithmic aspects of learning. Complexity limitations. Applications to pattern recog-

dition, image processing and combinatorial optimization. (.6 ED/.4 ES) Prerequisite: Electrical Engineering 151. One course. *Gelenbe*

261. Full Custom VLSI Design. A first course in VLSI design with CMOS technologies. A study of devices, circuits, fabrication technology, logic design techniques, subsystem design and system architecture. Modeling of circuits and subsystems. Testing of gates, subsystems and chips, and design for testability. The fundamentals of full-custom design, and some semi-custom design. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 151 or equivalent; Electrical Engineering 163L (or Biomedical Engineering 163L with consent of instructor) or equivalent. One course. *Dollas or Overhauser*

262. Advanced VLSI Design and Test. An advanced course in VLSI design with emphasis on the design of application specific IC's (ASIC) for a given set of specifications. Discussions of available technologies for ASIC implementation and tradeoffs in using these technologies. Static and dynamic CMOS design of commonly used circuits (adders, multipliers, RAM, pads). Packaging and testing of ASIC's with emphasis on functional and performance verification. This course stresses the design of ASIC's within a systems design environment and with the use of appropriate design tools that can be used to validate a design based on a given set of design specifications. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 261. One course. *Dollas or Kanopoulos*

266. VLSI Design Verification Techniques. VLSI verification tool design. Design and capabilities of circuit simulation, timing simulation, logic simulation, and functional simulation. Techniques applied in timing verification and other static verification tools. Parallel processing and its application to simulation. Physical design issues related to verification. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 261, working knowledge of C. One course. *Overhauser*

269. VLSI Chip Testing. Introduction to VLSI chip and system testing. Testing theory, strategies, and fault identification. Hands-on testing experience with faulty chips and systems, chips designed in Electrical Engineering 261, and testing equipment available in the department. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 261. One course. *Overhauser*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, and force and energy relations. Three class sessions. Consent of instructor required. (.25 ED/.75 ES) One course. *Joines*

272. Electromagnetic Communication Systems. Review of fundamental laws of Maxwell, Gauss, Ampere, and Faraday. Elements of waveguide propagation and antenna radiation. Analysis of antenna arrays by images. Determination of gain, loss, and noise temperature parameters for terrestrial and satellite electromagnetic communication systems. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 170L or 271. One course. *Joines*

273. Optical Communication Systems. Mathematical methods, physical ideas, and device concepts of optoelectronics. Maxwell's equations, and definitions of energy density and power flow. Transmission and reflection of plane waves at interfaces. Optical resonators, waveguides, fibers, and detectors are also presented. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 170L or equivalent. One course. *Joines*

274. Modern Optics I. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. Lecture and laboratory projects. (.25 ED/.75 ES) C-L: Physics 185. One course. *Guenther*

275. Microwave Electronic Circuits. Microwave circuit analysis and design techniques. Properties of planar transmission lines for integrated circuits. Matrix and computer-aided methods for analysis and design of circuit components. Analysis and design of input, output, and interstage networks for microwave transistor amplifiers and oscillators. Topics on stability, noise, and signal distortion. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 170L or equivalent. One course. *Joines*

276. Laser Physics. (.25 ED/.75 ES) Prerequisites: Electrical Engineering 170L or Physics 182 and Electrical Engineering 211 or Physics 211. See C-L: Physics 261. One course. *Skatrud*

281. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection, parameter estimation, and statistical signal processing. (1.0 ES) Prerequisite: Mathematics 135 or Statistics 113. One course. *Hansen*

282. Digital Signal Processing. Introduction to the fundamentals of processing signals by digital techniques with applications to practical problems. Discrete time signals and systems, elements of the Z-transform, discrete Fourier transforms, digital filter design techniques, fast Fourier transforms, and discrete random signals. (.5 ED/.5 ES) One course. *Nolte*

283. Digital Communication Systems. Digital modulation techniques. Coding theory. Transmission over bandwidth constrained channels. Signal fading and multipath effects. Spread spectrum. Optical transmission techniques. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 281 or consent of instructor. One course. *Bottomley*

285. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 281 or consent of instructor. One course. *Nolte*

286. Digital Processing of Speech Signals. Detailed treatment of the theory and application of digital speech processing. Modeling of the speech production system and speech signals; speech processing methods; digital techniques applied in speech transmission, speech synthesis, speech recognition, and speaker verification. Acoustic-phonetics, digital speech modeling techniques, LPC analysis methods, speech coding techniques. Application case studies: synthesis, vocoders, DTW (dynamic time warping)/HMM (hidden Markov modeling) recognition methods, speaker verification/identification. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 182 or equivalent or consent of instructor. One course. *Hansen*

287. Underwater Communications. Elements of communication theory and digital signal processing are combined with basic physics and oceanography to offer an overview of underwater communications, with an emphasis on the radar/sonar problem. Beamforming with transducer arrays. Signal design and target resolution; the ambiguity function. The ocean as a communication channel: sound propagation and ambient noise characteristics. Performance analysis of selected communication scenarios and case studies of operational sonar systems. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 181 or consent of instructor. One course. *Alexandrou*

288. Image and Array Signal Processing. Multidimensional digital signal processing with applications to practical problems in image and sensor array processing.

Two-dimensional discrete signals and systems, discrete random fields, 2-D sampling theory, 2-D transforms, image enhancement, image filtering and restoration, space-time signals, beamforming, and inverse problems. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 282 or consent of instructor. One course. *Krolik*

289. Adaptive Filters. Adaptive digital signal processing with emphasis on the theory and design of finite-impulse response adaptive filters. Stationary discrete-time stochastic processes, Wiener filter theory, the method of steepest descent, adaptive transverse filters using gradient-vector estimation, analysis of the LMS algorithm, least-squares methods, recursive least squares and least squares lattice adaptive filters. Application examples in noise cancelling, channel equalization, and array processing. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 281 and 282 or consent of instructor. One course. *Krolik*

299. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Consent of director of undergraduate studies and of supervising instructor required. One course. *Staff*

THE MAJOR

The major requirements are included in the minimum total of 34 courses listed under the general requirements and departmental requirements. The electrical engineering department requires the equivalent of 4.25 engineering design and 8.50 engineering science courses. This engineering design requirement must include a course which is more than 0.5 ED and must be taken in the junior or senior year of the program. This course must have as a prerequisite at least one course in the discipline.

Mechanical Engineering and Materials Science (ME)

Professor Cocks, *Chair*; Associate Professor Knight, *Director of Undergraduate Studies*; Professors Bejan, Dowell, Garg, Gösele, Harman, Hochmuth, Pearsall, Shaughnessy, Shepard, and Tan; Associate Professors Bliss, Eom, Jones, Needham, Quinlan, and Wright; Assistant Professors Buzzard, Chen, Clark, Hall, Howle, Thompson, and Virgin; Associate Research Professor Zhong; Assistant Research Professors Nagchaudhuri, Ting-Beall, and Zhelev; Adjunct Professors Lee and Wu; Adjunct Associate Professors Cherry, Crowson, and Tran-Son-Tay

A mechanical engineering major is available in this department.

Traditionally it was the mechanical engineer who designed the machinery that powered the factories and that manufactured and transported the goods that made possible the Industrial Revolution. The engines, turbines, rolling mills, forges, presses, machine tools, and manufacturing machinery required by this revolutionary period of mankind gave birth to the mechanical engineering profession. The modern mechanical engineer enjoys a very broad involvement within industry and may be found within almost all areas of our present technological society. Design of power plants and machinery remains at the heart of mechanical engineering but will today embody such modern concepts as robotics and computer or microprocessor controlled automation. The involvement of the mechanical engineer may run the entire spectrum from highly sophisticated analysis to the day-to-day problems of maintaining a manufacturing facility.

Technical sales is an area that many mechanical engineers find appealing and where they find themselves in great demand. Many mechanical engineers will use their technical background as a basis for further professional studies leading to such areas as patent law and industrial management. The search for solutions to society's problems requires the engineer to interact with other professions and disciplines, to reach out for an understanding of the economic, social, and political consequences of engineering

decisions. Elective opportunities in the social sciences, life sciences, and humanities help to fill this need.

The department has well equipped undergraduate and research laboratories along with a distinguished faculty committed to excellence in undergraduate instruction. Areas of faculty expertise include thermodynamics, heat transfer, fluid mechanics, aerodynamics, acoustics, computational fluid mechanics and heat transfer, control, robotics, expert systems, failure analysis, safe product design, biological fluid mechanics, biorheology, physical metallurgy, mechanical metallurgy, polymers, corrosion, electronic materials, and high temperature semiconductors. Independent study and the graduation with distinction programs allow qualified undergraduates to participate in the research programs of the department. In addition to a major in mechanical engineering, the department offers the opportunity for extensive study in the area of materials science.

11, 12. Undergraduate Research in Mechanical Engineering. An elective program in which undergraduate students participate in an ongoing program of research with mechanical engineering faculty members. The research topic pursued by the student is arranged by mutual agreement between the student and the participating faculty member. For freshmen only. Quarter course each. *Staff*

101L. Thermodynamics. The principal laws of thermodynamics for open and closed systems and their application in engineering. Properties of the pure substance, relationships among properties, mixtures and reactions. Power and refrigeration cycle analysis. (1.0 ES) Prerequisite: Physics 52L. One course. *Harman, Hochmuth, or Thompson*

115L. Failure Analysis and Prevention. A study and analysis of the causes of failure in engineering materials and the diagnosis of those causes. Elimination of failures through proper material selection, treatment, and use. Case histories. Examination of fracture surfaces. Laboratory investigations of different failure mechanisms. (.5 ED / .5 ES) Prerequisites: Engineering 75L and 83L or consent of instructor. One course. *Cocks, Jones, or Pearsall*

120L. Engineering Instrumentation and Measurements. Analysis, design, and application of instrumentation. Error analysis and propagation. Experimental laboratory with PC based measurement and data acquisition, analysis, and graphic display. (.25 ED / .75 ES) Corequisite: Mechanical Engineering 130L. One course. *Buzzard*

126L. Fluid Mechanics. An introductory course emphasizing the application of the principles of conservation of mass, momentum, and energy to a fluid system. Physical properties of fluids, dimensional analysis and similitude, viscous effects and integral boundary layer theory, subsonic and supersonic flows, normal shock waves. Selected laboratory work. (.25 ED / .75 ES) Corequisites: Engineering 123L and Mechanical Engineering 101L. One course. *Bliss, Hall, Hochmuth, Knight, or Shaughnessy*

130L. Modeling and Analysis of Dynamic Systems. Mathematical modeling of mechanical, electrical, fluid, and thermal systems. Emphasis is placed on a universal approach to system analysis. Topics include: state variables, linearization methods, transfer functions and block diagrams, and feedback techniques for the control of dynamic systems. (.25 ED / .75 ES) Prerequisites: Mathematics 103 and Physics 51L. One course. *R. Clark, Nagchaudhuri, Virgin, or Wright*

141L. Mechanical Design. A study of practical aspects of mechanical design including conceptualization, specifications, and selection of mechanical elements. The design and application of mechanical components such as gears, cams, bearings, springs, and shafts. Practice in application of the design process through design projects. (1.0 ED) Prerequisite: Mechanical Engineering 115L. One course. *Wright*

150L. Heat and Mass Transfer. A rigorous development of the laws of mass and energy transport as applied to a continuum. Energy transfer by conduction, convection, and radiation. Free and forced convection across boundary layers. Application to heat exchangers. Selected laboratory work. (.25 ED/.75 ES) Prerequisites: Mathematics 111 and Mechanical Engineering 126L. One course. *Chen, Howle, or Knight*

160L. Mechanical Systems Design. An integrative design course addressing both creative and practical aspects of the design of systems. Development of the creative design process, including problem formulation and needs analysis, feasibility, legal, economic and human factors, aesthetics, safety, synthesis of alternatives, and design optimization. Application of design methods through several projects including a term design project. (1.0 ED) Prerequisites: Mechanical Engineering 141L and 150L. One course. *Staff*

165. Special Topics in Mechanical Engineering. Study arranged on a special engineering topic in which the faculty has particular interest and competence as a result of research and professional activities. Consent of instructor and director of undergraduate studies required. Half course or one course each. Variable credit. *Staff*

183. Power Generation. Basic concepts of thermodynamics, heat transfer, and fluid flow applied to power generation processes. Nuclear reaction theory and reactor technology; fossil fuel combustion theory and modern boiler practice. Power plant ancillary equipment and processes. Design considerations and analyses include economic and environmental factors. (.5 ED/.5 ES) One course. *Harman*

198. Projects in Mechanical Engineering. Individual projects arranged in consultation with a faculty member. Open only to seniors enrolled in the graduation with distinction program or showing special aptitude for research. Half course to two courses. Prerequisites: B average and consent of the director of undergraduate studies. Variable credit. *Staff*

202. Engineering Thermodynamics. Axiomatic formulations of the first and second laws. General thermodynamic relationships and properties of real substances. Energy, availability, and second law analysis of energy conversion processes. Reaction and multiphase equilibrium. Power generation. Low temperature refrigeration and the third law of thermodynamics. Thermodynamic design. (.3 ED/.7 ES) One course. *Bejan*

207. Transport Phenomena in Biological Systems. (.25 ED/.75 ES) See C-L: Bio-medical Engineering 207; also C-L: Civil Engineering 207. One course. *Katz or Truskey*

208. Introduction to Colloid and Surface Science. This course divides naturally into three sections. The colloid state: classification of colloids and the theoretical frameworks and experimental techniques involved in their characterization. Interfaces: surface tension and free energy; curved interfaces; adhesion, cohesion and wetting; surface activity; catalytic and mechanical properties of solid surfaces. Inter-Surface Forces: the balance of attractive and repulsive forces which operate between colloidal particles and at macroscopic surfaces. Some emphasis on natural and artificial biomembranes. Consent of instructor required. (1.0 ES) One course. *Needham*

210. Intermediate Dynamics. Comprehensive treatment of space kinematics, kinetics of particles and rigid bodies, generalized coordinates, and Lagrange's equations. Introduction to nonlinear and random dynamic analysis of flexible, continuous systems and stability. (.25 ED/.75 ES) C-L: Civil Engineering 210. One course. *Hall or Knight*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering dealing specifically with the structure and properties of polymers. Particular attention paid to recent developments in the processing and use of modern plastics and fibers. Product design considered in terms of polymer structures,

processing techniques, and properties. (.6 ED/ .4 ES) C-L: Biomedical Engineering 208. One course. *H. Clark*

212. Electronic Materials. An advanced course in materials science and engineering dealing with the various materials important for solid-state electronics including semiconductors, ceramics, and polymers. Emphasis on thermodynamic concepts and on defects in these materials. Materials preparation and modification methods for technological applications. (.25 ED/ .75 ES) Prerequisite: Engineering 83L. One course. *Tan*

213. Physical Metallurgy. An advanced materials science course focusing on the relationships between structure and properties in metals and alloys. Conceptual and mathematical models developed and analyzed for crystal structures, elastic and plastic deformation, phase transformations, thermodynamic behavior, and electrical and magnetic properties. (.25 ED/ .75 ES) Prerequisites: Engineering 83L and Mechanical Engineering 101L. One course. *Pearsall*

214. Corrosion and Corrosion Control. Environmental aspects of the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. (.5 ED/ .5 ES) Prerequisite: Engineering 83L. One course. *Jones*

215. Biomedical Materials and Artificial Organs. (.5 ED/ .5 ES) Prerequisite: Biomedical Engineering 83L, Chemistry 151L or Engineering 83L or consent of instructor. See C-L: Biomedical Engineering 215. One course. *H. Clark or Reichert*

216. Mechanical Metallurgy. An advanced materials science course dealing with the response of materials to applied forces. Mechanical fundamentals; stress-strain relationships for elastic behavior; theory of plasticity. Metallurgical fundamentals; plastic deformation, dislocation theory; strengthening mechanisms. Mechanical behavior of polymers. Applications to materials testing. (.25 ED/ .75 ES) Prerequisites: Engineering 75L and Engineering 083L. One course. *Jones*

217. Fracture of Engineering Materials. Conventional design concepts and their relationship to the occurrence of fracture. Linear elastic and general yield fracture mechanics. Microscopic plastic deformation and crack propagation. The relationship between macroscopic and microscopic aspects of fracture. Time dependent fracture. Fracture of specific materials. (.7 ED/ .3 ES) Prerequisites: Engineering 83L and Mechanical Engineering 115L. One course. *Jones*

218. Thermodynamics of Electronic Materials. Basic thermodynamic concepts applied to solid state materials with emphasis on technologically relevant electronic materials such as silicon and GaAs. Thermodynamic functions, phase diagrams, solubilities and thermal equilibrium concentrations of point defects; nonequilibrium processes and the kinetic phenomena of diffusion, precipitation, and growth. (.25 ED/ .75 ES) One course. *Tan*

221. Compressible Fluid Flow. Basic concepts of the flow of gases from the subsonic to the hypersonic regime. One-dimensional wave motion, the acoustic equations, and waves of finite amplitude. Effects of area change, friction, heat transfer, and shock on one-dimensional flow. Moving and oblique shock waves and Prandtl-Meyer expansion. (.25 ED/ .75 ES) One course. *Shaughnessy*

225. Mechanics of Viscous Fluids. Equations of motion for a viscous fluid, general properties and selected solutions of the Navier-Stokes equations, the Stokes equations, laminar boundary layer equations with selected solutions and approximation techniques, origin of turbulence. (1.0 ES) One course. *Hochmuth*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics, fluid statics, surface tension, the Eulerian and Lagrangian description, kinematics, Reynolds transport theorem, the differential and integral equations of motion, constitutive equations for a Newtonian fluid, the Navier-Stokes equations, and boundary conditions on velocity and stress at material interfaces. (1.0 ES) One course. *Shaughnessy or Thompson*

227. Advanced Fluid Mechanics. Flow of a uniform incompressible viscous fluid. Exact solutions to the Navier-Stokes equation. Similarity methods. Irrotational flow theory and its applications. Elements of boundary layer theory. (1.0 ES) Prerequisite: Mechanical Engineering 226 or consent of instructor. One course. *Shaughnessy*

228. Lubrication. Derivation and application of the basic governing equations for lubrication; the Reynolds equation and energy equation for thin films. Analytical and computational solutions to the governing equations. Analysis and design of hydrostatic and hydrodynamic slider bearings and journal bearings. Introduction to the effects of fluid inertia and compressibility. Dynamic characteristics of a fluid film and effects of bearing design on dynamics of machinery. (.25 ED / .75 ES) Prerequisites: Mathematics 111 and Mechanical Engineering 126L. One course. *Knight*

229. Computational Fluid Mechanics and Heat Transfer. An exposition of numerical techniques commonly used for the solution of partial differential equations encountered in engineering physics. Finite-difference schemes (which are well-suited for fluid mechanics problems); notions of accuracy, conservation, consistency, stability, and convergence. Recent applications of weighted residuals methods (Galerkin), finite-element methods, and grid generation techniques. Through specific examples, the student is guided to construct and assess the performance of the numerical scheme selected for the particular type of transport equation (parabolic, elliptic, or hyperbolic). (.5 ED / .5 ES) One course. *Howle*

230. Modern Control and Dynamic Systems. Dynamic modeling of complex linear and nonlinear physical systems involving the storage and transfer of matter and energy. Unified treatment of active and passive mechanical, electrical, and fluid systems. State-space formulation of physical systems. Time and frequency-domain representation. Controllability and observability concepts. System response using analytical and computational techniques. Lyapunov method for system stability. Modification of system characteristics using feedback control and compensation. Emphasis on application of techniques to physical systems. (.25 ED / .75 ES) One course. *Garg or Nagchaudhuri*

231. Adaptive Structures: Dynamics and Control. Integration of structural dynamics, linear systems theory, signal processing, transduction device dynamics, and control theory for modeling and design of adaptive structures. Classical and modern control approaches applied to reverberant plants. Fundamentals of adaptive feedforward control and its integration with feedback control. Presentation of a methodical design approach to adaptive systems and structures with emphasis on the physics of the system. Numerous MATLAB examples provided with course material as well as classroom and laboratory demonstrations. (.25 ED / .75 ES) One course. *Clark*

232. Optimal Control. (.4 ED / .6 ES) Prerequisite: Electrical Engineering 141 or equivalent. See C-L: Electrical Engineering 246. One course. *Rindos*

235. Advanced Mechanical Vibrations. Analytical and experimental procedures applied to the design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques, transfer matrices applied to lumped and distributed systems, analytical and numerical methods of obtaining the pulse response of plane and three-dimensional multimass systems,

convolution and data processing, introduction to random vibration. (.25 ED / .75 ES) One course. *Knight or Wright*

236. Engineering Acoustics. Fundamentals of acoustics including sound generation, propagation, reflection, absorption, and scattering. Emphasis on basic principles and analytical methods in the description of wave motion and the characterization of sound fields. Applications including topics from noise control, sound reproduction, architectural acoustics, and aerodynamic noise. Occasional classroom or laboratory demonstration. (.25 ED / .75 ES) Prerequisites: Engineering 123L and Mathematics 111 or consent of instructor. One course. *Bliss*

237. Aerodynamics. Fundamentals of aerodynamics applied to wings and bodies in subsonic and supersonic flow. Basic principles of fluid mechanics and analytical methods for aerodynamic analysis. Two- and three-dimensional wing theory, slender-body theory, lifting surface methods, vortex and wave drag. Brief introduction to vehicle design, performance, and dynamics. Special topics such as unsteady aerodynamics, vortex wake behavior, and propeller and rotor aerodynamics. (.25 ED / .75 ES) One course. *Bliss*

238. Advanced Aerodynamics. Advanced topics in aerodynamics. Conformal transformation techniques. Three-dimensional wing theory, optimal span loading for planar and nonplanar wings. Ground effect and tunnel corrections. Propeller theory. Slender wing theory and slender body theory, transonic and supersonic area rules for minimization of wave drag. Numerical methods in aerodynamics including source panel and vortex lattice methods. (1.0 ES) Prerequisite: Mechanical Engineering 237. One course. *Hall*

239. Unsteady Aerodynamics. Analytical and numerical methods for computing the unsteady aerodynamic behavior of airfoils and wings. Small disturbance approximation to the full potential equation. Unsteady vortex dynamics. Kelvin impulse and apparent mass concepts applied to unsteady flows. Two-dimensional unsteady thin airfoil theory. Time domain and frequency domain analyses of unsteady flows. Three-dimensional unsteady wing theory. Introduction to unsteady aerodynamic behavior of turbomachinery. (1.0 ES) Prerequisite: Mechanical Engineering 237. One course. *Hall*

240. Patent Technology and Law. The use of patents as a technological data base is emphasized including information retrieval in selected engineering disciplines. Fundamentals of patent law and patent office procedures. Consent of instructor required. (.6 ED / .4 ES) C-L: Law 358. One course. *Cocks*

245. Applications in Expert Systems. A comprehensive introduction to the key practical principles, techniques, and tools being used to implement knowledge-based systems. The classic MYCIN system studied in detail to provide historic perspective. Current systems employing combinations of production rules, prototypical knowledge, and frame-based case studies. Student term projects consist of the development of individual, unique expert systems using the Texas Instruments Personal Consultant. Knowledge of LISP not a prerequisite. (.5 ED / .5 ES) One course. *Wright*

252. Buckling of Engineering Structures. (.25 ED / .75 ES) Prerequisite: Civil Engineering 131L or consent of instructor. See C-L: Civil Engineering 252. One course. *Virgin*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. Approval of director of undergraduate or graduate studies required. Variable credit. *Staff*

268. Cellular and Biosurface Engineering. A combination of fundamental concepts in materials science, colloids, and interfaces that form a basis for characterizing: the physical properties of biopolymers, microparticles, artificial membranes, biological

membranes, and cells; and the interactions of these materials at biofluid interfaces. Definition of the subject as a coherent discipline and application of its fundamental concepts to biology, medicine, and biotechnology. (1.0 ES) Prerequisite: Mechanical Engineering 208 or consent of instructor. One course. *Needham*

270. Robot Control and Automation. Review of kinematics and dynamics of robotic devices; mechanical considerations in design of automated systems and processes, hydraulic and pneumatic control of components and circuits; stability analysis of robots involving nonlinearities; robotic sensors and interfacing; flexible manufacturing; man-machine interaction and safety consideration. (.5 ED/ .5 ES) Prerequisites: Mechanical Engineering 230 or equivalent and consent of instructor. One course. *Garg*

275. Product Safety and Design. An advanced engineering design course that develops approaches to assessing and improving the safety of products and product systems. Safety is presented in terms of acceptable risk and analyzed through legal case studies. Probabilistic decision making; risk economics; risk analysis and assessment. (.75 ED/ .25 ES) Corequisite: Mechanical Engineering 160L. One course. *Pearsall*

277. Optimization Methods for Mechanical Design. Definition of optimal design. Methodology of constructing quantitative mathematical models. Nonlinear programming methods for finding "best" combination of design variables: minimizing steps, gradient methods, flexible tolerance techniques for unconstrained and constrained problems. Emphasis on computer applications and term projects. Consent of instructor required. (.5 ED/ .5 ES) One course. *Wright*

280. Convective Heat Transfer. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow, nucleation, boiling, and condensation heat and mass transfer. (1.0 ES) One course. *Bejan*

281. Conduction and Radiation. Conduction heat transfer in the steady and transient state, in rectangular, cylindrical, and spherical coordinates. Melting and solidification. Radiation exchange involving absorbing and emitting media including gases and flames, combined conduction and radiation, and combined convection and radiation. Exact and approximate methods of solution including separation of variables, transform calculus, numerical procedures, and integral and variational methods. (1.0 ES) One course. *Bejan*

290. Physical Oceanography. Introduction to the dynamic principles of ocean circulation with an emphasis on large temporal and spatial scales of motion. Topics include wind-driven and density-driven flow, western boundary intensification, mid-ocean, shelf, and tropical circulations. (1.0 ES) Corequisite: Geology 250. Prerequisites: Mathematics 31 and 32 or consent of instructor. C-L: Environment 290 and Geology 203. One course. *Lozier*

COURSES CURRENTLY UNSCHEDULED

102. Thermodynamics II

113. Introduction to Electronic Materials

224. An Introduction to Turbulence

THE MAJOR

The major requirements are included in the minimum total of thirty-four courses listed under the general requirements and departmental requirements. Specific courses which must be included are Engineering 75L, 83L, and 123L; Mechanical Engineering 101L, 115L, 120L, 126L, 130L, 141L, 150L, and 160L.

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